NETWORK WORLD

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BOCs divulge genesis of CCS7 crashes

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Bell operating company representatives have uncovered the cause of their recent network outages, but industry experts warn there may not be a foolproof way to prevent failures from recurring.

Network outages at both Bell Atlantic Corp. and Pacific Telesis Group were tied to a glitch in a software upgrade DSC Communications Corp. issued in April to users of its signal transfer points (STP), the devices driving the carriers' Common Channel Signaling System 7 (CCS7) nets.

Frank Perpiglia, vice-president of technology and product development at DSC, said his company failed to detect the glitch because the modification was so minor that the software wasn't put through the company's usual three- to four-month testing process.

The crux of the problem, he told a congressional subcommittee last week, was that three or four lines of code containing algorithms that control STP error messages had been omitted.

The outages were triggered by routine STP problems, such as circuit board failures, which

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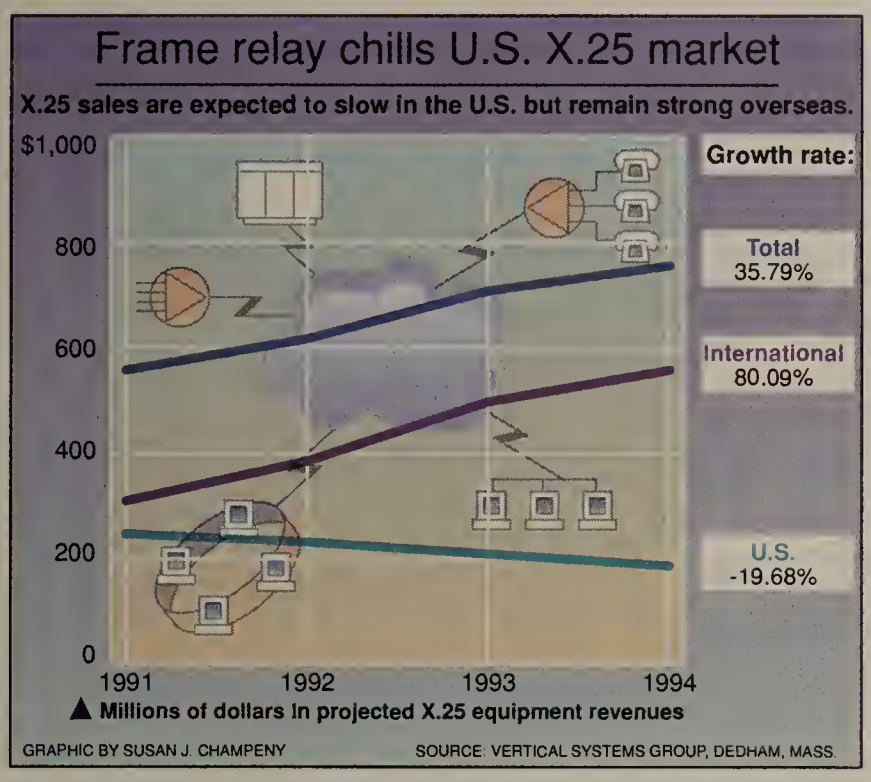

Emergence of frame relay may impair X.25 growth

By Bob Brown
Senior Editor

The advent of frame relay may hobble future growth of X.25 packet networking in the U.S. as users look to the new technology as a more efficient means of supporting bandwidth-intensive applications such as LAN interconnection.

X.25 equipment vendors admit the market is headed for a slide, and consequently, many said they are scaling back on X.25 product development in favor of products and services based on frame relay technology.

In addition, equipment vendors said they will focus X.25 sales and marketing efforts abroad, where demand for packet switching is expected to remain strong. But vendors said they will be careful to provide current users with a migration path from X.25 to frame relay and will not force them to change technologies.

"All X.25 vendors are compelled to look at frame relay today," said Jay Hill, president of Amnet, Inc., a Framingham, Mass., maker of X.25 packet-

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Coalition forming to advance FDDI on UTP

Five vendors, including Apple, AT&T, to team on ANSI proposal for unshielded twisted-pair FDDI.

By Caryn Gillooly
Senior Editor

A group led by five major vendors will announce within the next few weeks the formation of a consortium to promote standardization of Fiber Distributed Data Interface over unshielded twisted-pair wire.

Members of the group, called the UTP Development Forum (UDF), include Apple Computer, Inc., AT&T Microelectronics, Crescendo Communications, Inc., Fibronics International, Inc. and Ungermann-Bass, Inc.

UDF plans to propose to ANSI a method for running FDDI over unshielded twisted pair that will likely include technology developed by Crescendo.

Crescendo's design is one of two technologies that have already been suggested to ANSI as a way to enhance FDDI by letting customers use inexpensive copper wire to tie workstations to 100M bit/sec FDDI fiber backbone networks.

Crescendo's technology allows 100M bit/sec transmission over either voice- or data-grade twisted-pair wire, but it involves altering the Physical Media Dependent (PMD) layer of the current FDDI specification. It uses a lower frequency encoding scheme that reduces electronic emissions, which will require a different PMD component on FDDI chipsets.

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INSIDE

Evaluating distributed approaches to network management, page 53.

GE division builds global LAN internet

By Timothy O'Brien
West Coast Bureau Chief

SAN JOSE, Calif. — The GE Nuclear Energy Division last week awarded a multimillion-dollar contract to Hughes LAN Systems for deployment of an enterprise network linking LANs and personal computers at its manufacturing sites and offices worldwide.

The General Electric Co. division will install Banyan Systems, Inc. VINES local-area networks throughout its campus facility here that will support communications among a variety of computing platforms. The campus net will be linked through a range of GE network services to LANs and personal computers at nine other U.S. facilities, as well as offices in Asia and Europe.

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NETLINE

CHIP MAKER UNWRAPS single-chip Ethernet controller, which may signal the end of the net interface card. Page 4.

UNIX GAINS POPULARITY in operating system market, but it still trails DOS, OS/2. Page 4.

NETWORK OUTAGES play role in lawmakers' debate over lifting the RBHC manufacturing ban. Page 4.

GTE PARTNERS WITH Soviet ministry to improve int'l calling services between Moscow and U.S., U.K. Page 5.

FINANCIAL TRADERS FRET over nets' ability to deliver adequate service levels. Page 5.

IBM HAS MADE many promises about OS/2, but there's still no reason for users to rush to this choice. Page 61.

NEWSPAPER

FEATURE

How to guard nets against the growing virus plague

By Salvatore Salamone
Features Writer

Viruses have crippled networks in the past, and they'll do it again. But you can reduce the risk of a virus incapacitating your network by taking preventive measures. In particular, you need to formulate an antivirus network strategy.

The necessity for such a plan is rapidly becoming acute: Security analysts expect an enormous growth in viruses over the next few years. However, while the need for protection against viruses is widely recognized, few users have actually taken steps to safeguard their networks.

Two recent studies of network security show that only about 10% of computer sites nationwide have installed virus protection software or network security systems. These research studies were conducted by Market Intelligence Research Corp. of Mountain View, Calif., and Certus International Corp., a Cleveland-based antivirus consulting firm and software vendor.

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Borland buys Ashton-Tate to lead PC data base charge

Acquisition would enable Borland to focus efforts on developing DBMSs for client/server networks.

By Bob Brown
Senior Editor

SCOTTS VALLEY, Calif. — Borland International, Inc. last week agreed to acquire Ashton-Tate Corp. in a stock swap valued at about $439 million, a move that will unite the top players in the personal computer data base market.

The acquisition, which would make Borland a $500 million company and the dominant vendor of microcomputer data base management systems, should enable the firm to step up efforts to produce products for client/server network environments.

Although it is subject to shareholder and government approval, the buyout is expected to be completed by year end.

Philippe Kahn, Borland's chairman, president and chief executive officer, said the acquisition would enable Borland to offer users "a range of software — from data bases and spreadsheets to graphics and programming languages — designed for client/server computing architectures on a variety of platforms."

Borland officials pledged to protect customers' investments in Ashton-Tate's market-leading dBASE DBMS software, though analysts said Borland will likely encourage the millions of dBASE users to migrate to its own Para-

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CSU upgrades packet net to frame relay-based T-1 net

Move provides bandwidth to link LANs at 20 sites.

By Paul Desmond
Senior Editor

LOS ALAMITOS, Calif. — The California State University (CSU) system last week announced it is upgrading its statewide private packet-switched network to a 21-node frame relay-based T-1 network, part of which has already been cut over.

The upgraded network, based on StrataCom, Inc. multiplexers, will provide much needed bandwidth to link local-area networks at CSU's 20 campuses. It will also support emerging video teaching and videoconferencing applications.

"In an era of declining budgets and expanding needs of students and faculty, it's important for us to be able to make resources at one campus available at all campuses," said Chris Taylor, manager of the network, dubbed CSUNET.

All CSU campuses, including the information resources center here, are equipped with at least one Cisco Systems, Inc. router that provides a wide-area link for campus Ethernets supporting Transmission Control Protocol/Internet Protocol, Apple Computer, Inc. AppleTalk and Digital Equipment Corp. DECnet traffic.

At one time, the routers fed into six Telematics International, Inc. X.25 packet switches that

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Vendors respond to users' cry for peer-to-peer LANs

By Caryn Gillooly
Senior Editor

If 1988, '89 or '90 was the year of the local-area network, 1991 may prove to be the year of the peer-to-peer LAN.

Although peer LANs have been around for years, vendors have made several moves over the past six months in response to a sharp increase in user demand, not only from small and midsize businesses, but also from large corporations in need of a low-cost network for use in remote offices and work groups.

In April, Apple Computer, Inc. announced System 7, a peer-to-peer operating system for the Macintosh environment. Late last month, Tiara Computer Systems, Inc. spent $2.5 million to buy peer-to-peer vendor 10NET Communications from Digital Communications Associates, Inc. Moreover, Artisoft, Inc. — the leader in the peer-to-peer LAN market — recently brought out a version of its product that will run in conjunction with Novell, Inc.'s NetWare, giving NetWare customers peer-to-peer capabilities.

Industry reports also indicate that Novell may soon follow with a peer-to-peer version of its Net-

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Briefs

AT&T waives onetime ASDS fees. AT&T last week filed tariff revisions that will allow it to waive nonrecurring installation charges for new interstate Accunet Spectrum of Digital Services (ASDS) and Dataphone Digital Service circuits. Examples of charges that would be waived include $1,052 for an M-24 multiplexer, a $327 T-1 access connection charge and a $207 ASDS 56K bit/sec access connection fee. A minimum purchase of two circuits is required. The promotion starts July 23 and ends Sept. 30. Users taking advantage of the deal must request that the new circuits be installed by Jan. 31, 1992.

Defense Dept. taps NET for muxes. The Department of Defense last week awarded NET Federal, Inc., a subsidiary of Network Equipment Technologies, Inc., a contract valued at $13 million to supply the department and other federal agencies with multiplexers, channel banks and other communications gear. Much of the equipment will be used to build the Air Force's Integrated Digital Telecommunications Network, a T-1 backbone network that will link U.S. Air Force bases worldwide and support voice, data, video and image traffic.

NET Federal officials said they expect to sign within the next three months an even broader contract with the Defense Department that could exceed $100 million in products and services over the next 10 years.

House passes spectrum bill. The U.S. House of Representatives last week passed by voice vote H.R. 531, a bill introduced by Rep. John Dingell (D-Mich.), which would reallocate 200 MHz of government spectrum to the private sector. However, the Bush administration made it clear that the president will veto the Dingell spectrum bill as it stands because it does not include provisions for spectrum auctioning. In a compromise stance, Rep. Edward Markey (D-Mass.) said he plans to hold hearings in September on devising new methods of allowing the government to earn funds through the spectrum allocation process.

IBM acquires Metaphor. IBM last week agreed to purchase Metaphor Computer Systems, Inc., a Mountain View, Calif., software firm in which IBM already owned an interest. Terms of the deal were not disclosed, but observers said IBM probably paid about $100 million for Metaphor.

IBM and Metaphor first got together in 1988 under a technology exchange and joint product development agreement that also included IBM's initial investment in Metaphor, which was believed to be about $10 million. Last September, the companies established a joint venture called Patriot Partners in order to develop object-oriented software designed to work with multiple operating systems and networks. The team effort is expected to be merged with a new company that IBM earlier this month said it plans to form with Apple Computer, Inc.

US Sprint offers ISDN promo. US Sprint Communications Co. last week announced that it will waive the usual $2,000 installation charge for customers signing up for Integrated Services Digital Network Primary Rate Interface (PRI) service during a promotional period running until the end of this year. The company said it will also waive the installation fee for customers ordering ISDN backup D channels during this time. US Sprint's ISDN promotion requires that customers place their ISDN PRI orders by Dec. 31 for line installation by March 31, 1992.

IBM unfolds OS strategy. IBM last week attempted to quell customer fears that the vendor's deal with Apple Computer, Inc. to develop a new operating system would have an adverse effect on its support for OS/2. At a technology briefing, Joe Guglielmi, IBM's vice-president and general manager of marketing and business development for personal systems, said, "OS/2 remains a fundamental strategy today while technology evolves and is brought to market."

The new operating system developed with Apple will be based on object-oriented technology and will be able to run OS/2, Macintosh and IBM AIX applications. According to IBM, it will be a separate operating system instead of being layered on top of other operating systems. IBM also stressed it will provide a smooth migration path between OS/2 and the new operating system. "[IBM will] use OS/2 as a springboard into the new object-oriented environment," Guglielmi said.

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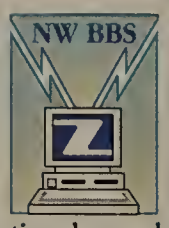

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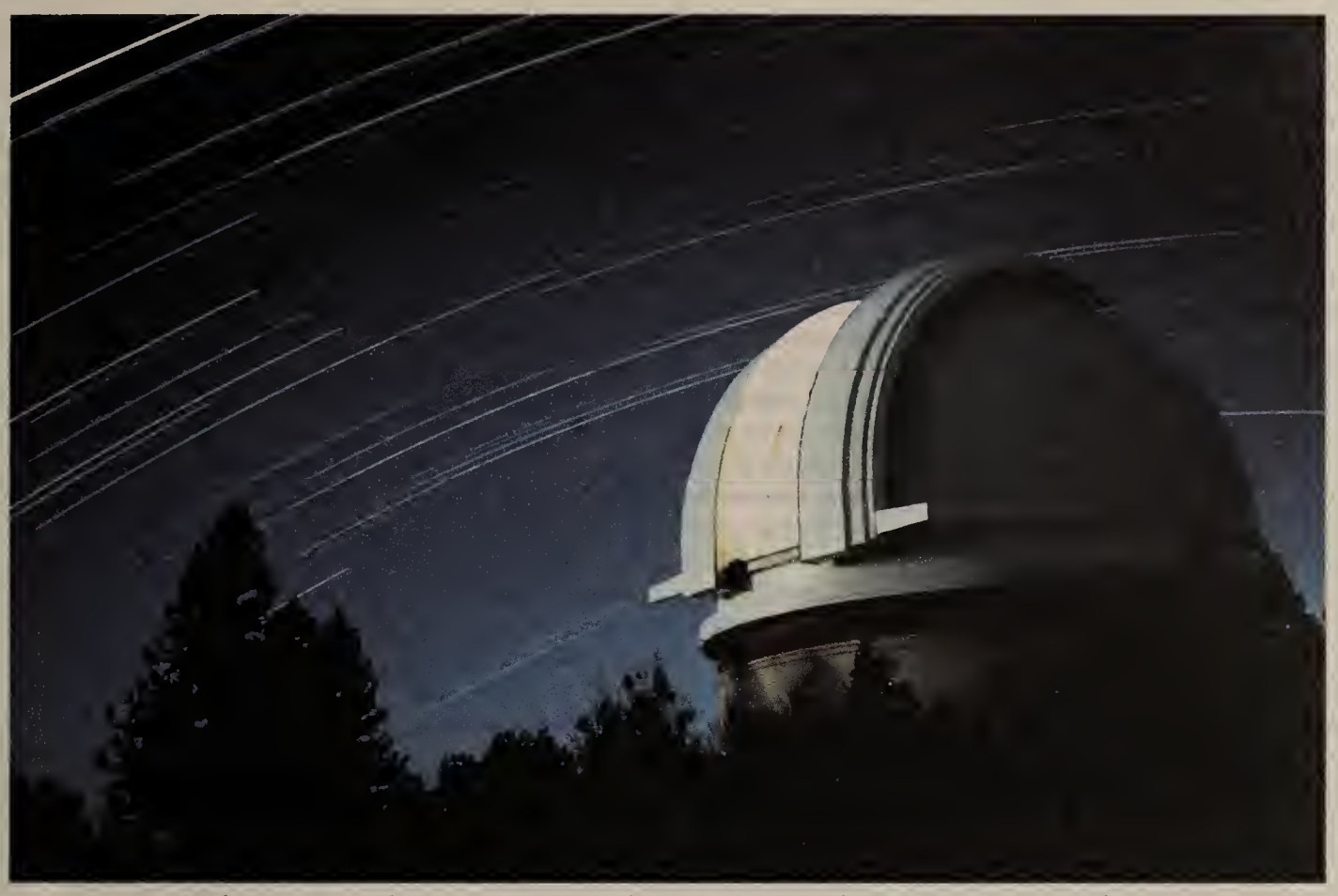

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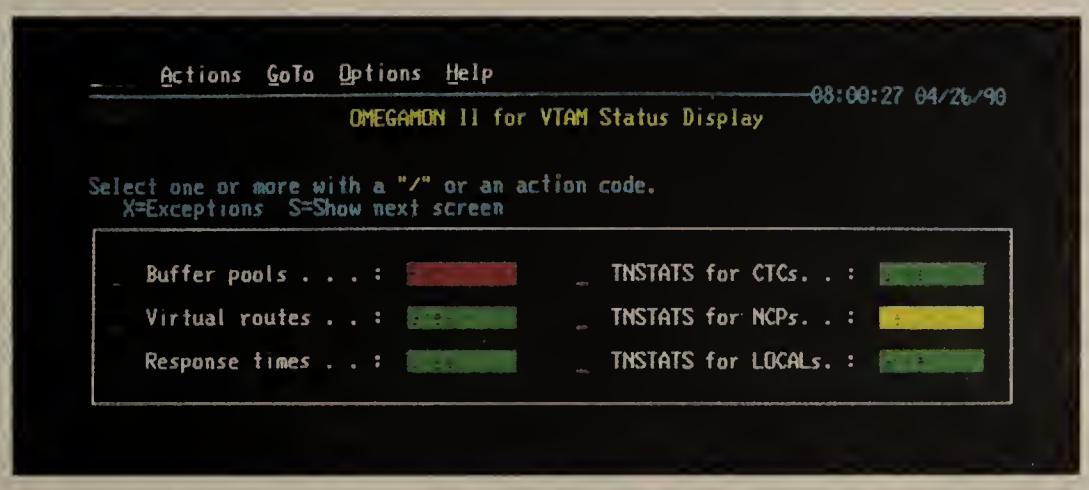

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Circle Reader Service #134

Firm devises single-chip E-net device

By Eric Smalley
Senior Editor

SANTA CLARA, Calif, — National Semiconductor Corp. last week introduced a single-chip Ethernet adapter that can be used in both 10BaseT and coaxial cable network environments.

The Serial Twisted-pair Network Interface Controller (ST-NIC) takes up less room on a circuit board than the company's two- and three-chip adapters, making it easier for vendors to add Ethernet adapter cards to notebook, desktop and laptop microcomputers.

The ST-NIC is also a significant step toward the integration of all Ethernet adapter card functions onto a single chip — a development that could signal the end of the network interface card.

The product combines three components on one chip: the network interface controller, a coder/decoder and the 10BaseT transceiver of National Semiconductor's three-chip Ethernet controller. The ST-NIC chip offers a 20% reduction in board space and a 400% reduction in power consumption over the three-chip Ethernet adapter.

Artisoft, Inc., Cabletron Systems, Inc., Hewlett-Packard Co., Novell, Inc.'s Eagle Technology unit and Xircom will employ the ST-NIC chip in end-user products, according to National Semiconductor officials.

In addition to the ST-NIC chip, the company offers a 10BaseT daughterboard that allows manufacturers to convert existing coaxial Ethernet adapter cards to support 10BaseT without requiring other hardware or software changes, according to Edwin De Souza, design manager for National Semiconductor's local-area network products group.

The low-power consumption of the ST-NIC is important for the emerging application of microcomputer-based minihubs, said J. Michael Sodergren, marketing director for National Semiconductor's LAN business group. The ST-NIC can be combined with an Ethernet repeater chip to build a minihub that does not unduly burden the host microcomputer.

The ST-NIC will be used for integrating Ethernet on printer motherboards as well as those for microcomputers, De Souza said.

National Semiconductor will continue integrating its Ethernet design and plans to release its next-generation product some time next year. That product will include system interface components and will essentially be a full Ethernet adapter on a chip.

Many manufacturers, such as Apple Computer, Inc. and Compaq Computer Corp., are unlikely to wait for that level of integration before putting Ethernet controllers directly on the motherboards of their computers.

"Lots of folks are going to just drop the [ST-NIC] chip on their motherboards," said Rich Seifert, president of Networks and Communications Consulting, a consulting firm in Cupertino, Calif. "You will see the chip, or chips like it, dropped into every non-entry level, non-IBM machine."

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Unix acceptance growing, but DOS, OS/2 will prevail

Inherent network tools and RISC help spur usage of Unix in business, but it may be too little, too late.

First in a three-part series examining trends in desktop operating systems.

By Eric Smalley
Senior Editor

Unix, once thought of as an operating system only for academics and engineers, has been making steady inroads into the commercial network market and, although it is not likely to supplant MS-DOS or OS/2, could gain a significant share of the desktop operating system market over the next few years.

There are several reasons for the potential success of Unix in the commercial market, one of which is the increasing popularity of Reduced Instruction Set Computer-based desktop computers, which offer an attractive price/performance ratio and almost exclusively run Unix.

Another reason is the powerful networking capabilities associated with the operating system. Unix is multitasking and usually comes bundled with Transmission Control Protocol/Internet Protocol networking software.

Today, however, Unix is still largely confined to use in high-performance technical workstations and high-end microcomputers. In this market segment, Unix represents one of the fastest growing operating systems in the computer industry, according to Rikki Kirzner, an analyst with Dataquest, Inc., a San Jose, Calif.-based market research firm.

Of the overall desktop operating system market, however, Unix is not expected to become the next DOS and, according to Gartner Group, Inc., a market research firm in Stamford, Conn., it will have the smallest market share of the major desktop operating systems through 1994.

In fact, new shipments of DOS will still be more than double the number of new shipments of Unix by 1995, and new shipments of the start-up OS/2 will catch up to Unix early next year, according to Gartner Group.

The recent alliance between IBM and Apple Computer, Inc. could, however, change the balance of power among desktop operating systems. IBM and Apple have stated they will develop a microcomputer version of AIX, IBM's Unix implementation, that incorporates Apple's popular user interface.

However, IBM has invested heavily in OS/2 as its operating system of choice for microcomputers, and the IBM-Apple alli-

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House waffles over two RBHC manufacturing bills

Lack of support tied to concern over outages.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — In the wake of the Senate's passage of a bill to lift the RBHC manufacturing ban, the House Telecommunications Subcommittee last week convened to weigh the issue in a debate clearly colored by legislative concern over recent telephone network outages.

While many subcommittee members agreed the ban on the regional Bell holding companies should be lifted, they showed no signs of rallying around any specific legislative approach to allowing the companies into manufacturing. This problem has bogged down previous "free the Bells" efforts in the House.

Under discussion last week were two House bills, H.R. 1523 and 1527, which seek to lift the RBHC manufacturing ban. H.R. 1527 is virtually identical to S. 173, Sen. Ernest Hollings' (D-S.C.) bill, which was recently approved by the Senate (see "BOCs divulge genesis of CCS7 crashes," page 1). H.R. 1523 mirrors S. 173 also, but does not contain the domestic-manufacturing requirement included in the Hollings bill that the Bush administration has labeled as protectionist.

Rep. Edward Markey (D-Mass.), chairman of the telecommunications subcommittee, is also expected to introduce legislation soon, and as the most powerful member of that subcommittee, his support is key to moving any bill forward.

But lawmakers' comments revealed that the network outages of Bell Atlantic Corp. and Pacific Telesis Group had influenced their thinking on support for legislation in a variety of ways.

Markey said the outages reinforced his belief that any legislation to lift the RBHC manufacturing ban should also address the issue of RBHC network reliability and service requirements.

Other congressmen expressed dismay that the two Bells had to seek special permission from U.S. District Court Judge Harold Greene to resolve problems with their Common Channel Signaling System 7 nets (see "RBHCs solicit MFJ waiver," page 89).

Rep. Billy Tauzin (D-La.), who introduced H.R. 1527 with Rep. Jim Slattery (D-Kan.), said, "They shouldn't have to check with a judge to see if it's OK."

But Rep. Jim Cooper (D-Tenn.), who opposes lifting the manufacturing ban, pointed to the fact that Greene had posed no obstacles to resolving outage-related problems. Cooper accused the Bells of turning the outage situation into a public relations campaign to lift the Modified Final Judgment.

Cooper said two Bell companies, whom he did not name, last week said that having to deal with the Department of Justice and Greene had compounded the problem of dealing with the outage.

The hearing also included testimony from government and industry witnesses airing their positions on the House bills.

According to Janice Obuchowski, assistant secretary for communications and information at the National Telecommunications and Information Administration, the Bush administration supports H.R. 1523. But she said that President Bush would seek a veto of H.R. 1527 because it requires the Bells to manufacture 60% of their equipment in the U.S.

During the hearing, Obuchowski said RBHC technical expertise was going to waste because of the manufacturing ban, adding "For many of [the Bells], thinking about manufacturing is like lust in the heart, because it could lead to illicit actions."

Markey responded, "Our concern is that if there is lust in the heart, it shouldn't result in the consumer getting screwed."

Robert Allen, chairman of AT&T, and Michael Birck, chairman of the Tele-Communications Association, Inc., both appeared as witnesses to warn subcommittee members that lifting the ban would be harmful because of the Bells' monopoly powers.

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Circle Reader Service #135

New firm to improve int'l calling service to U.S.S.R.

Joint effort of GTE Corp., Soviet Union ministry.

By Barton Crockett
Senior Editor

MOSCOW — GTE Corp. last week said it has partnered with the Soviet Union's Ministry of Communications to create a company that will provide high-quality international calling services to hotels and businesses here.

The newly formed Sovintel is building a digital microwave network that will route calls from users' premises to an international satellite hub. From there, the calls will be routed to gateways in the U.S. and U.K. for termination via the public switched network. This will enable callers to bypass the feeble public net.

"I think it has the potential to be very significant, particularly for travelers from the Western world," said C.J. Waylan, president of GTE Spacenet Corp. in McLean, Va., the GTE unit heading the project.

GTE officials said it can take between three and four hours to initiate or receive calls via the public net here. Sovintel, by contrast, will offer call setup and termination times equivalent to Western public net times.

Sovintel will also offer prices that are at least 20% to 30% below rates charged by the Soviet Union's Ministry of Communications, Waylan said. Sovintel calling charges will average about $6 per minute for service to the U.S.

Northern Telecom wares

Waylan said Sovintel plans to commence service in November. In its initial implementation, Sovintel is installing Northern Telecom, Inc. Meridian 1 private branch exchanges in four hotels and one business office complex, called the Expocenter. The PBXs will be linked via microwave to a fiber cable that will route calls to a Northern Telecom DMS 300 international gateway switch.

The switch will be linked via microwave to a remote International Telecommunications Satellite Organization satellite earth station, which will transmit traffic to international gateways in the U.S. and U.K. These gateways will dump Sovintel traffic into the public net.

Sovintel users will also receive their own area code that will enable them to receive international calls via the bypass network. Waylan said Sovintel users do not pay for Sovintel PBXs or microwave links, but instead guarantee minimum calling volumes.

Waylan declined to detail these calling volumes, but he said Sovintel would be willing to discuss extending its net to users that can guarantee calling volumes equivalent to that generated by a hotel with 200 to 300 rooms.

GTE Corp. expects to invest $5 million to $10 million in Sovintel facilities, while the Soviet Union's Ministry of Communications will invest manpower and Russian rubles that are not convertible to Western currency. A third, minor Sovintel partner is San Francisco/Moscow Teleport, Inc.

Waylan said the Sovintel venture is unique. But Belgium's national carrier, Regie des Telegraphes et Telephones, is involved in a joint venture with Alcatel, S.A. to build a similar overlay network for international calling services in Moscow, according to Susan Mirbach, president of the Belgian carrier's U.S. unit.

Users express fears about global trading nets' abilities

By Barton Crockett
Senior Editor

CHICAGO — As two leading exchanges here prepare to cut over a high-profile trading network later this year, observers say network performance problems could limit acceptance of the service.

Reports that response times on the new Globex trading network may not be acceptable and that use of satellite links could put some traders at a disadvantage are leading some observers to question whether electronic trading networks will live up to their early billing as the wave of the future in the trading industry.

"I'm somewhat skeptical about the abilities of the system to come on stream and operate as efficiently as it must," said Jack Lehman III, senior executive vice-president of the Lehman Brothers unit of Shearson Lehman Brothers, Inc. in New York. "And there are questions as to whether [electronic trading networks like Globex] will be competitive [with existing trading procedures]."

Globex is a joint venture of the Chicago Board of Trade, the Chicago Mercantile Exchange and Reuters Holdings PLC. It aims to extend the operating hours of the exchanges by supporting electronic trading after trading floors close.

High hopes

Globex is expected to be the largest trading network ever developed in the U.S., shuttling data from hundreds of terminals on traders' desks worldwide, via a private global net operated by Reuters, to computers in a data center here that will match up buyers and sellers.

Its success or failure will be a harbinger of prospects for other large-scale trading networks, many experts say.

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Vendors respond to cry for LANs

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Ware network operating system.

Peer-to-peer LANs are network operating systems that reside on clusters of as many as 20 personal computers in a LAN and provide each workstation with file, message and peripheral sharing — all without the need for a dedicated server.

Analysts said improved technology and low-cost peer-to-peer LAN software are two factors driving user demand.

Users are beginning to pinpoint more precisely their network needs and how quickly their networks will grow, analysts said. Customers with simple printer- and file-sharing needs that only a year ago would have automatically bought a NetWare LAN, today are realizing the advantages of a low-cost, easy-to-use, peer-to-peer alternative, vendors said.

Improved technology is also erasing the bad memories users have of early peer-to-peer LAN products. When LANs first began to find their way into corporate environments, the most powerful machines most users had on their desks were powered by Intel Corp. 8086 or 8088 microprocessors.

According to Jack Schoof, president and chief executive officer of Artisoft, those machines did not have the horsepower or memory to support a peer-to-peer environment.

"With earlier versions of our product, we had to build power into the boards because, in those days, the 8088s just couldn't keep up [with networking speeds]," he said. Now most users have at least an 80286-based unit on their desks, which is equal to the server requirement of a NetWare 286-based LAN.

Schoof said the first peer-to-peer LAN, offered by The TOPS Division of Sun Microsystems, Inc. — now Sitka Corp. — was a memory hog. "The early peer-to-peer products were huge. Unfortunately, that gave people a bad taste about peer-to-peer LANs," he said. Today, Artisoft's LANtastic takes up 50K bytes or less of memory in each personal computer.

According to Richard Tayman, systems analyst for the environmental division of the Department of Justice, the need for low-cost basic network services was precisely what led him to install LANtastic for the general litigation staff at the site of the Exxon Corp. Valdez oil spill in Prince William Sound, Alaska.

"We needed something low cost, easy to install and easy to maintain," Tayman said. "We had to find a way to fly out in a two- to three-day trip, install and configure the network, fly back and not have to deal with a lot of maintenance issues."

The users only needed a dial-up connection to the agency's headquarters in Washington, D.C., Tayman said. "[Users] just needed to share printers and transmit files without having to use a sneakernet," he said.

The LANtastic setup cost about $250 per node, Tayman said, compared to a NetWare LAN that would have cost upwards of $1,000 per node. In addition, he said, "We didn't want to have to buy an extra PC [for the server] *and* buy the network when we could just buy the network."

There are maintenance-related advantages to a peer-to-peer LAN, such as lack of server crashes. If, for example, the server on a NetWare LAN crashes, the entire network is brought down. If one node on a peer-to-peer LAN has a problem, it does not halt the network; the user just has to shut off that machine, and the rest of the network is unaffected.

Analysts expect a lot more action in the peer network market in coming months because it is one of the few untapped veins in the LAN market.

Jamie Lewis, vice-president at Clarke Burton Corp., a consultancy in Salt Lake City, agreed. "When the LAN market widened out, it started to segment," he said. "The high end is where Novell, Microsoft [Corp.] and Banyan [Systems, Inc.] specialize. But that leaves a hole at the low end. Not only will the low-end market never go away, it will continue to get bigger."

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CSU upgrades packet net to T-1 net

continued from page 2

were linked with 56K bit/sec digital facilities, the school's backbone network. The switches also enabled microcomputer users to dial into attached hosts.

Taylor said that the backbone ran out of capacity when network usage skyrocketed after CSUNET was linked to the nationwide Internet in 1988. In January 1989, CSUNET supported about 3.5G bytes of data per month, and by the end of 1990, that figure was up to 35G bytes a month.

To accommodate that growth, CSU decided to upgrade its 56K bit/sec backbone to T-1 but was hesitant to migrate from a packet-switched to a circuit-switched environment.

Dave Reese, manager of the network engineering group at CSU, said the school had experience with packet switching and wanted to stay with that technology. Moreover, it did not want to fragment backbone bandwidth into various sized channels and dedicate those channels to specific applications.

T-1 fast-packet multiplexers with frame relay interfaces from StrataCom offered an opportunity to move up to T-1 speeds and stay with packet switching. The multiplexers also promised to let CSU avoid channelizing backbone bandwidth because they assign backbone bandwidth on an as-needed basis.

The school has installed five of the 21 IPX multiplexers that it purchased from DEC. Two more are scheduled to be cutover this week.

The IPXs are linked to the Cisco routers via frame relay interfaces, which are already supporting traffic between TCP/IP-based LANs, the fastest-growing type of data traffic in the school system, according to Taylor.

Reese said that linking the Cisco routers through the IPX frame relay net had minimal impact on performance when compared to connecting the routers directly with T-1 links. To determine the difference, he ran tests comparing response times of the two configurations by transmitting 100-byte packets.

The tests showed a round-trip response time improvement of 2 to 3 msec using frame relay in a configuration with two hops — meaning data starts at one node, passes a second, ends up at a third and then returns.

He attributed the improvement to the fact that, with frame relay, packets don't have to leave the IPX backbone and go through the intermediary router. Instead, a virtual permanent circuit is established and frame relay packets have the addressing function required to let the IPX find the destination node on its own. The router believes that it is communicating with another router and is unaware of the intermediary nodes. The response time for a three-hop IPX frame relay link was the same as for a two-hop Cisco-only link, Reese said.

A one-hop configuration — one router connected directly to another over a T-1 line — proved to be 2 to 3 msec faster than using back-to-back IPXs with routers hung off both ends. That was because the IPX-to-router link basically creates an extra hop at each end, he said.

Some bugs

CSU has come across some bugs with the frame relay network, most notably with Cisco's implementation of DECnet. Reese said the routers were not broadcasting information about the availability of frame relay paths to the various campus Ethernets. VAXes were, therefore, unaware that the routes existed and didn't use them.

Cisco acknowledged it is working on the problem, and Reese said he expected the fix will be delivered sometime this week. DECnet support is working in other user networks, according to Cisco.

Reese said CSU also had problems with Cicso's AppleTalk frame relay sofware. The router would take AppleTalk packets in, but kept them in its buffer until it became overloaded and the interface shut down.

That software was a prerelease version, which was used with the understanding that it had not yet been tested, Reese said. Support for AppleTalk over frame relay is expected with Release 8.3 of Cisco's router software in September, according to Cisco.

Release 8.3 will also support Novell, Inc.'s Internetwork Packet Exchange (IPX), Xerox Corp.'s XNS, Banyan Systems, Inc.'s VINES and the Open Systems Interconnection Connectionless IP protocols. The current release supports only DECnet and IP.

Telematics has also promised frame relay support for its packet switches, Taylor said. That means CSU's packet switches will be able to share the same T-1 bandwidth with the routers, thus providing better bandwidth utilization. In the meantime, the switches will use their own separate backbone channnels.

Clarification: The story "OSI limitations may ground airline net," (*NW*, July 1) may have led some readers to believe that problems with Open Systems Interconnection technology could prevent deployment of the Aeronautical Telecommunications Network, a mobile net that will support air-to-air and air-to-ground communications for commercial and government aviation. Engineers involved with the project are working to resolve OSI problems, and the net is moving toward completion.

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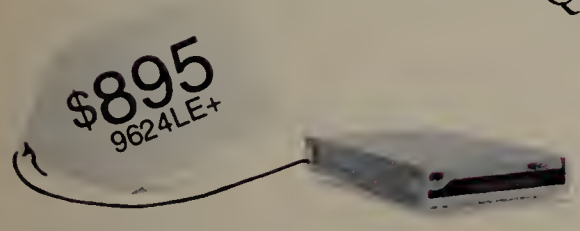

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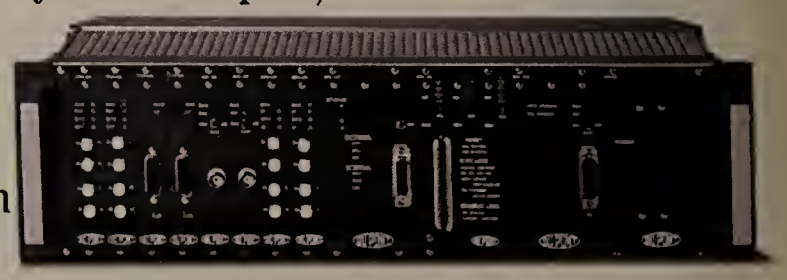

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Circle Reader Service #106

Worth Noting

"International Data Corp. believes that DEC's token-ring strategy is a much needed move for the company, as increasing numbers of large sites have both Ethernet and token-ring LAN technologies installed."

Susan Frankle
Analyst
International Data Corp.
Framingham, Mass.
Commenting on DEC's plan to resell Proteon, Inc. token-ring products

People & Positions

AT&T last week announced that **Robert Kavner,** an AT&T group executive for data systems and federal systems, has been given the additional responsibility of supporting the AT&T Communications Products Group.

Kavner will continue to oversee the integration of AT&T Computer Systems into NCR Corp. He will also continue to head AT&T's federal systems and Unix Systems Laboratories business units.

His new units, formerly supported by Frank Blount, are AT&T Consumer Products, AT&T Paradyne, Business Communications Systems, Communications Products Sourcing, General Business Systems and Manufacturing, and Material Management Services.

Kavner will also establish a new unit called AT&T Development Corp., an internal venture capital business whose charter is to take advantage of AT&T technologies in markets not addressed by existing units.

Blount left AT&T last week after being named president and chief executive officer of New American Schools Development Corp., a nonprofit outfit established by business leaders at the request of President Bush.

CLI to sell Ascend gear for switched videoconferences

Vendor to market Ascend's Multiband controller.

By Bob Brown
Senior Editor

SAN JOSE, Calif. — Compression Labs, Inc. (CLI) recently announced a reseller agreement with Ascend Communications, Inc. under which CLI will package Ascend's bandwidth controllers with its own videoconferencing systems.

CLI officials said the nonexclusive, three-year agreement is designed to help make videoconferencing more accessible to users by making it easier to conduct videoconferences via switched services offered over the public network.

One of the major obstacles to videoconferencing's acceptance has been that users are forced to support videoconferences via leased lines, which can be expensive for an application that may be used only occasionally.

But with Ascend's Multiband Bandwidth-On-Demand Controller, a cross between a multiplexer and a data service unit/channel service unit, videoconferencing users can access high-speed public network services via Integrated Services Digital Network Basic Rate Interface, Primary Rate Interface and T-1 access circuits. The Multiband product combines individual local switched 56K, 64K and 384K bit/sec circuits for bandwidth on demand from 56K to 2.048M bit/sec (E-1).

The Multiband controller will be integrated with CLI's new Rembrandt II/VP video coder/decoder (codec), which was unveiled last month and is available now ("CLI announces revised version of Rembrandt," *NW,* June 24).

The Rembrandt II/VP supports speeds ranging from 56K to the E-1 rate of 2.048M bit/sec, superseding existing CLI systems that focused on either the low or high end of the scale.

While no software hooks have been built in the Ascend product or the CLI codec to let either product work with the other in any special way, such technology integration is possible down the road, said John Walsh, executive vice-president of sales and marketing for CLI.

Currently, the integration of the two companies' products refers to the ability to house the Ascend system within the videoconferencing system rack, he added.

The Ascend product dials out to the local exchange carrier central office and requests several

(continued on page 12)

INDUSTRY BRIEFS

US Sprint wins two contracts. US Sprint Communications Co. last week announced the signing of multimillion-dollar contracts with Silicon Graphics, Inc. and Publishers Discount Warehouse.

Under the two-year, $5.4 million Silicon Graphics agreement, US Sprint will provide its Virtual Private Network, Ultra 800 and FONCard services.

Publishers Discount Warehouse, based in Houston, signed a two-year, $3 million deal with US Sprint, which will provide the nationwide magazine subscription marketer with inbound and outbound WATS services and 800 services.

AT&T picks distributor. AT&T Computer Systems last week said it has selected Electronic Information Systems, Inc. (EIS) as the exclusive distributor of AT&T's two telemarketing software systems.

Under the terms of the agreement, AT&T will transfer sales and support responsibility for its Outbound Call Management Plus and Solution Package I software to the Stamford, Conn.-based company.

EIS, which markets its own Call Processing System hardware and software, will support AT&T's 4,700 installed agent stations and enhance the AT&T products.

ACC divides operation to serve markets. Advanced Computer Communications last week announced it has completed the separation of its commercial internetworking

(continued on page 12)

RBHCs' CCS7 equipment deployment

RBHC	Number of LATAs	Number of STPs deployed	STP vendor (pairs of switches supported)
Ameritech	42	8 in 4 LATAs	DSC Communications Corp.
Bell Atlantic Corp.	19	12 in 6 LATAs	DSC (3 pairs) AT&T Network Systems Group (3 pairs)
BellSouth Corp.	38	70 in 34 LATAs	AT&T Network Systems Group (2 pairs) Northern Telecom, Inc. (21 pairs) Ericsson Network Systems (12 pairs)
Nynex Corp.	12	10 in 5 LATAs	AT&T Network Systems Group (1 pair) Northern Telecom (4 pairs)
Pacific Telesis Group	10	4 in 2 LATAs	DSC
Southwestern Bell Corp.	28	4 in 2 LATAs	AT&T Network Systems Group
US West, Inc.	27	14 in 6 LATAs	Ericsson Network Systems

STP = Signal transfer points, the packet switches used for Signaling System 7

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *NETWORK WORLD*

Concerns mount over reliability of CCS7

Some observers question maturity of CCS7's auto management features; others call for backup plan.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The network outages that have afflicted The Chesapeake and Potomac Telephone Co. (C&P) and Pacific Bell in recent weeks have raised new concerns about Common Channel Signaling System 7 (CCS7) technology.

Some CCS7 service providers are now calling for development and deployment of a national backup plan for CCS7 networks that would supersede existing contingency plans supported by carriers.

Some carriers are even beginning to question whether the automated management capabilities of CCS7 are mature enough to manage CCS7 networks without human intervention.

"The CCS7 protocol is a relatively new protocol designed to do a lot of automatic management functions," said Bruce Johnson, staff director of signaling at Nynex Corp.

The C&P incident "shows we need more management controls," he said.

A probe launched by Bell Communications Research to determine the cause of the outages may well result in new requirements for the CCITT standard for CCS7 networks.

Dennis Parker, president and chief executive officer of Independent Telecommunications Network, Inc., which operates CCS7 network hubs for both local and long-distance providers, recently asked Federal Communications Commission Chairman Alfred Sikes to help coordinate efforts to develop a national backup plan.

In a July 2 letter to Sikes, Parker noted that a catastrophic failure, such as the one that hit C&P here on June 26, could happen to any carrier. Therefore, a national CCS7 backup plan is needed, Parker said, emphasizing in his letter that the FCC is "the best focal point for stimulating such action."

In the letter, Parker stated, "Such a plan [if possible] would configure the separate networks to back up each other in the event of a serious failure."

At a House Telecommunications Subcommittee hearing last week, Rep. Edward Markey (D-Mass.) demanded a reason for the outages. Executives from Bell Atlantic Corp. (parent of C&P), Pacific Bell and switch vendor DSC Communications Corp. pointed to DSC's flawed switch software as the cause.

But John O'Rourke, Bellcore's

(continued on page 12)

Concerns mount over reliability of CCS7

continued from page 11

assistant vice-president for switching technology, analysis and reliability, and head of the national task force investigating the network outages, told Markey he is not convinced the root of the problems has been found.

Carriers also had a difficult time addressing questions by Markey and Rep. Matthew Rinaldo (R-N.J.) about why existing backup systems are ineffective. Neither carrier would give a definitive answer.

Currently, all seven regional Bell holding companies deploy their CCS7 switches, called signal tranfer points (STP), in pairs for redundancy in accordance with Bellcore recommendations. But the Bellcore net configuration was ineffective in preventing the Bell Atlantic and Pacific Bell network crashes brought on by STP malfunctions in equipment and software supplied by DSC.

All of the RBHCs follow a Bellcore net configuration that calls for mated STPs, each designed to handle an anticipated 40% traffic load and act as hot backups for its partner.

While linked, the switches support an alternate call-handling procedure. If one switch fails, traffic is shifted to the remaining one, which theoretically can handle the 80% load.

The RBHCs are in various stages of STP deployment (see graphic, page 11). Currently, only Ameritech, Bell Atlantic and Pacific Telesis Group use DSC STPs, but a Southwestern Bell Corp. spokesman said that company will finish installing two pairs of DSC switches in Houston and Oklahoma City by year end.

To date, both Bell Atlantic and Pacific Bell remained interested but uncommitted to the idea of developing a nationwide redundancy plan.

In reaction to the proposed backup plan, Ross Ireland, general manager of network services at Pacific Bell, said, "A national backup plan? I don't know. I'd have to think it through."

CLI sells Ascend gear for videoconferences

continued from page 11

56K bit/sec or other speed circuits to pool them together to form a virtual circuit large enough to support a video feed.

The Multiband controller "will help to speed the coming together" of the new CLI's codec's support for high-speed network services and the growing array of high-speed switched services themselves, Walsh said.

Videoconferencing customer premises equipment must be linked to the public network via a multiplexer, DSU/CSU or some other such device, he said.

Multiband for Rembrandt II/VP will be available during this quarter. Pricing will range from $7,000 to $10,000, depending upon model and configuration.

Users could use Ascend's system in conjunction with videoconferencing gear made by other vendors, although Walsh said that the agreement between CLI and Ascend will ensure the utmost interoperability between products made by the two companies.

Industry Briefs

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business and its government business operations by forming two companies.

The internetworking operation will retain the name of Advanced Computer Communications and continue to focus on the development of bridge, router and network management products.

The parent company, now ACC Systems, will continue to produce military networking products.

This action completes a two-year process that began when Advanced Computer Communications created a Government Systems Division in Columbus, Md., and a Bridge/Router Division in Santa Barbara, Calif.

Mitel tops satisfaction poll. Dataquest, Inc., a San Jose, Calif., market research firm, last week said Mitel Corp. ranked No. 1 in Dataquest's private branch exchange customer satisfaction survey.

In interviews with some 3,000 PBX users, Mitel proved to be the best vendor for service and value, two of the six indicators measured by Dataquest.

AT&T, Northern Telecom, Ltd., Rolm Co. and Toshiba Corp. rounded out the top five vendors in overall customer satisfaction.

AT&T scored highest on quality, documentation and training. Rolm was found to have the most responsive and capable sales representatives, while Northern Telecom was ranked as the top vendor for commitment to the customer.

SynOptics unveils reseller plan. SynOptics Communications, Inc. recently rolled out the SynOptics Qualified Partners Program for its resellers and distributors.

Under the program, SynOptics will assist its channel partners by offering discounts, funds for market development and joint marketing opportunities.

The program is designed to reward those resellers and distributors that become certified as SynOptics Authorized Training Centers and focus on customer support and service.

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Features	NSA	DCA	Attachmate
Real memory use for one 3270 session (PC-DOS)	65Kb	136Kb(1)	101Kb(2)
APPC support	Yes	Yes(3)	No
Number of data links supported	7	5	4
Number of coax and SDLC cards supported	39	5	17
SNA protocols supported	3270 APPC RJE LU0	3270 APPC	3270
Async SNA support	Yes	No	No

Based on published marketing materials from DCA and Attachmate. (1) For IRMAX DFT running DFTSX module. (2) For EXTRA Extended in Standard Mode. (3) DOS APPC support limited to DCA/Microsoft Select CS. Trademark ownership: Windows (by Microsoft), DCA and IRMAX (by Digital Communications Assoc.), Attachmate and EXTRA (by Attachmate).

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Circle Reader Service #124

Worth Noting

The Better Business Bureau of Metropolitan New York recently introduced a 900 service that consumers can use to retrieve reliability reports about more than 15,000 local businesses and charities. The service, which costs 85 cents per minute, is being provided by Sprint TeleMedia, a unit of US Sprint Communications Co.

Carrier Watch

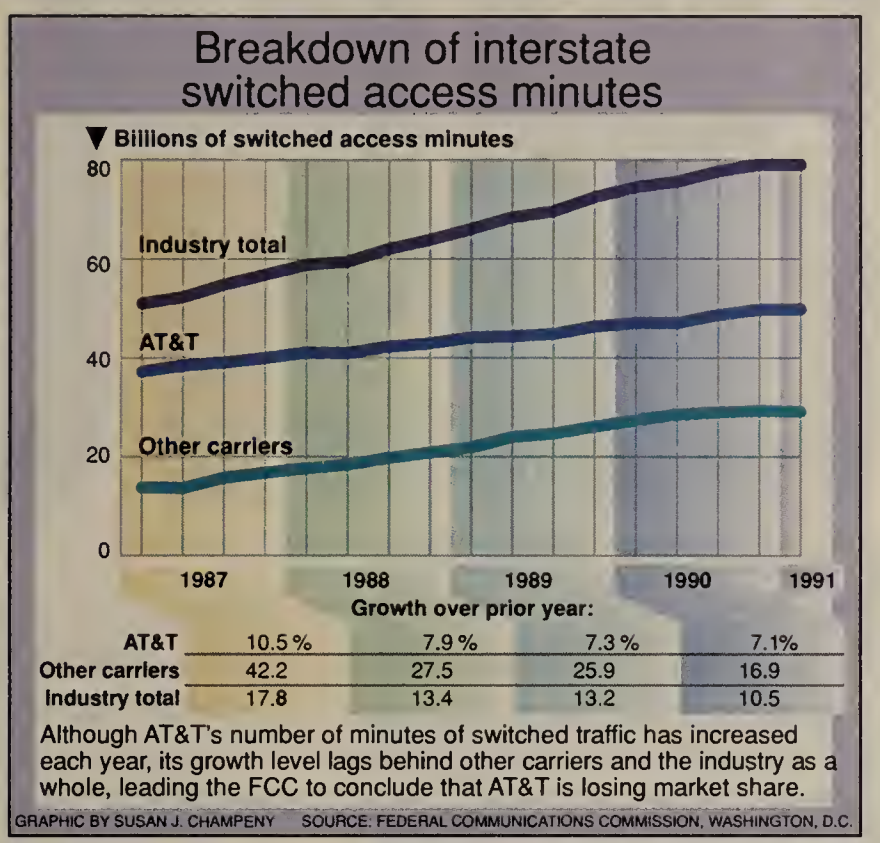
AT&T last week announced a voice mail service for customers of its Software-Defined Network (SDN) service that will enable users to send and receive voice mail messages over their virtual private networks.

The SDN Voice Mail service will support several SDN dialing plans, including Network Remote Access options, which let customers access their networks from remote locations.

The service extends to users most of the same capabilities of private voice mail systems, including the ability to broadcast messages to as many as 20 other users. It costs $13 monthly for each mailbox.

In other AT&T news, **Voluntary Hospitals of America, Inc. (VHA),** an alliance of health care organizations, last week announced that it has renewed an agreement with AT&T under which it will resell the carrier's SDN service to hospitals, as well as peddle AT&T's Definity Communications Systems Generic 1 and 2 private branch exchanges and Audix voice messaging systems.

The agreement could be worth as much as $200 million over time, according to VHA.



Growth over prior year:

AT&T	10.5 %	7.9 %	7.3 %	7.1%
Other carriers	42.2	27.5	25.9	16.9
Industry total	17.8	13.4	13.2	10.5

Although AT&T's number of minutes of switched traffic has increased each year, its growth level lags behind other carriers and the industry as a whole, leading the FCC to conclude that AT&T is losing market share.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.

US Sprint challenges FCC's long-distance market data

Controversy involves AT&T's power in market.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — US Sprint Communications Co. has raised questions about the accuracy of some data the FCC is using to back up a number of major decisions it is expected to announce in August about competition in the long-distance market.

Next month, the Federal Communications Commission is expected to resolve pending proceedings concerning Tariff 12, Tariff 15 and relaxed regulation of AT&T; decisions that could substantially alter the rules of the game for long-distance carriers.

A central point in all of these debates is how much market power AT&T still wields, and whether or not the FCC can relax regulation of AT&T without damaging competition.

One of the key indicators in these disputes is AT&T's share of the long-distance market. Most observers say AT&T's current share of the total market is about 60% to70%. The FCC's own numbers, which do not include figures for private lines, say AT&T has about 63% of the switched traffic market.

Although AT&T's market share has declined since divestiture in 1984, there is debate over how far it has fallen and which way it is headed. The FCC's numbers show that in the first quarter of this year, AT&T's market share crept up slightly for the first time since divestiture.

But the FCC's numbers also had shown that AT&T increased its market share during the second quarter of 1990. However, the FCC later revised the numbers to show an AT&T loss. The reason for the revision, according to the FCC, is that one of the major sources of information, the National Exchange Carriers Association, frequently revises its numbers as it collects additional data from the entire industry.

Cloud of doubt

Earlier this month, US Sprint said there was enough doubt about the FCC market share figures to compel the agency to address that problem before proceeding with major decisions.

"While there may be legitimate reasons for all of the these changes, repeated corrections — both up and down, without any discernible pattern — cast substantial doubt on the accuracy of the information provided," said US Sprint counsel Leon Kestenbaum, in a letter to FCC Common Carrier Bureau Chief Richard Firestone.

"The process of calculating market share based upon numbers which are likely to undergo continued revision is a little bit like building on sand," the letter stated.

As an example, Kestenbaum said that AT&T's market share for switched access minutes for the first quarter of 1989 have been revised seven times. Initially, AT&T's share was reported to be 66.8%. In later revisions, the FCC changed that number to 66.1%, 65.9%, 65.4%, 66.1%, 66.1% again, 66.6% and 66.7%.

US Sprint also disputed the way in which the FCC computes

(continued on page 14)

Texaco has difficulty finding ISDN a home

Central technology department identifies ISDN's potential, but business managers are not biting.

By Bob Wallace
Senior Editor

HOUSTON — After years of research in which Texaco, Inc. examined all facets of Information Services Digital Networks and spelled out the benefits and drawbacks of the service for corporate business units, few uses have been found for the technology.

Although Texaco uses ISDN to support a printer sharing application at its headquarters here, some the barriers preventing wider use of ISDN include the high cost of long-haul services and lack of terminal portability.

The lack of acceptance has not been due to lack of effort of the company's Information Technology Department (ITD) .

After researching ISDN for two years, ITD wrote a white paper about the service for internal distribution and even conducted technology conferences that showcased ISDN applications for the company's business units.

"We've done everything we can to educate people on what ISDN is, explain the benefits it promises and show how it can be used," said James Keathley, a member of Texaco's ITD staff. "All we can do now is stay abreast of developments with ISDN."

The white paper explained what ISDN is, the current state of ISDN standards, the significance of Common Channel Signaling System 7, and carrier and switch vendor implementations of ISDN.

The paper also explained potential ISDN applications, including local-area network interconnection, screen sharing and caller identification, and discussed how Texaco competitors Tenneco Oil Co. and Shell Oil Co. are using the technology.

Keathley loaded the paper into a Texaco mainframe application called Technology Information Exchange System (TIES), which enabled employees to read about the technology on-line or print out copies of the paper. "Putting the white paper on TIES is one giant step toward information sharing," Keathley said. That effort set the stage for a demonstration of ISDN applications.

Keathley then decided to showcase ISDN applications in a multivendor demonstration as part of Texaco's annual technol-

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

FCC designs plan for dealing with net outages. The Federal Communications Commission last week laid out a four-point plan for dealing with the network outages experienced by Bell Atlantic Corp. and Pacific Bell over the last few weeks. In a meeting last week, top FCC officials reviewed the outages and concluded that the problems were "the inadvertent side effects of continuing progress, rather than evidence of any fundamental flaws [in the public network]." However, they decided that further investigation is needed to minimize disruption to the net as new technologies are implemented.

As a first step, the FCC said that as soon as possible it will convene a meeting of local and long-distance carriers, equipment and software providers, standards organizations and users groups to discuss efforts to prevent service outages.

Additionally, the FCC intends to step up research on how service disruptions are handled in industries such as transportation and electric utilities. The FCC will also designate a group of staff members to investigate network performance issues and work with the National Coordinating Center, a quasi-governmental agency that oversees emergency preparedness plans for the U.S. The FCC's fourth response will be to establish a formal notification process for net problems. Currently, carriers report problems to the FCC but there is no set time limit within which they must contact the agency nor any criteria on what types of outages must be reported.

Texaco tries to find ISDN a home

continued from page 13

ogy conference here last fall. The three-day event, which drew more than 500 people, was designed primarily to acquaint Texaco business unit managers with technologies that could make their operations more efficient.

The oil company demonstrated help desk and videoconferencing applications using ISDN at the event.

"The attendees were impressed [with the ISDN demonstrations]," Keathley recalled. "Those who knew something about communications and networking naturally seemed the most interested. Others probably saw the applications as a whiz-bang demonstration and didn't really understand what ISDN is."

Although Keathley said the conference achieved its goal of educating attendees about the promise of ISDN, demand for the service has not picked up substantially.

In fact, the high cost of long-haul ISDN services threatens to keep Texaco from using the technology for one application that seemed ideal.

Texaco is considering using AT&T's ISDN Primary Rate Interface (PRI) links to consolidate access links for Megacom 800 traffic and two switched 56K bit/sec circuits for a 112K bit/sec videoconferencing application.

Although the PRI links could save money by consolidating access links for the services on a single T-1 line, a good portion of the anticipated savings would evaporate because of the higher cost of PRI.

"It's frustrating," Keathley said. "We want to use ISDN, but we have to take a hard look at how much less savings we would [realize] by going with the PRI in place of a T-1."

Keathley said he would like to see AT&T halve its $3,000 one-time installation charge for each ISDN PRI and the $400-per-month PRI charge.

The high price for ISDN PRI service is not the only obstacle to ISDN use at Texaco. Keathley is also concerned about the lack of terminal portability, or the ability to use any ISDN station equipment with any switch.

Texaco uses AT&T, Mitel Corp., Northern Telecom, Inc. and Rolm Co. private branch exchanges, most of which are covered by five-year leases. Centrex PBXs are also used at some small locations. Keathley said he would like to save money by retaining the telephones when the leases expire and installing a different vendor's switch.

Today, however, one switch maker's ISDN telephones cannot be used with another switch maker's PBX because each vendor implements ISDN differently. Terminal portability with Centrex is not possible today because there is no standard for a single interface between station equipment and central office switches.

But Keathley is still committed to ISDN and pledges ITD's resources to any party interested in implementing the technology. "If people have an application for ISDN, we'll help them get it off the ground," he said. "But if they don't have a business use for it, we're not going to do technology for technology's sake."

US Sprint challenges data

continued from page 13

market share, claiming that some of the mathematical assumptions used may result in underestimates of AT&T's numbers.

Some observers said that if the carrier is shown to be continually losing market share, it would bolster the FCC's attempt to decrease regulation of AT&T. The carrier did not accuse the agency of intentionally skewing the figures but called on the FCC to review its procedures.

FCC officials have pointed to AT&T's loss of market share since divestiture as one reason they believe regulation can be decreased, but FCC Chairman Alfred Sikes has emphasized that market share alone is not enough to determine the correct level of regulation for the carrier.

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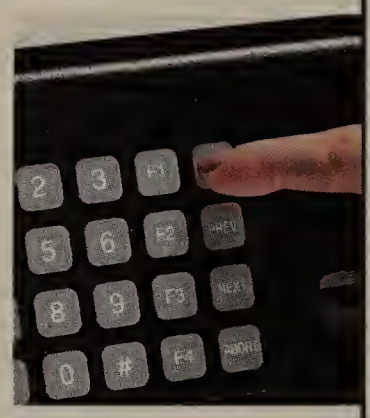

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Selina Lo
Internetworking product-line manager
Network Equipment Technologies, Inc.
Redwood City, Calif.

Data Packets

Cisco Systems, Inc. and **ADC/Kentrox Industries, Inc.** last week announced they have delivered a proposal for a Switched Multimegabit Data Service (SMDS) interface to the SMDS Interest Group, a vendor group chartered to promote interoperability of SMDS products.

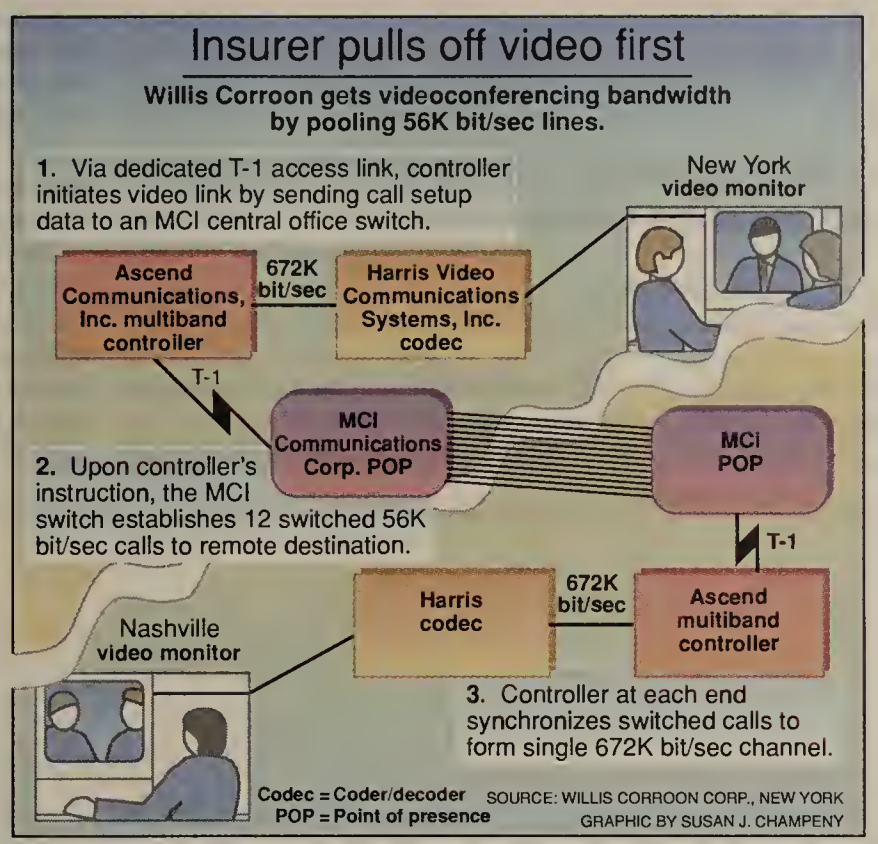
The companies' specification is for a T-1 or T-3 link between a router and an SMDS-capable data service unit/-channel service unit, Cisco said.

In other SMDS news, **Wellfleet Communications Corp.** recently announced its routers will undergo SMDS interoperability testing in **Pacific Bell's** laboratory in San Ramon, Calif.

Davox Corp. of Billerica, Mass., last week announced new software that lets users ship data from an IBM Application System/400 minicomputer to a Davox CAS 1500 predictive dialer.

The new Davox/400 software runs on the AS/400 and manages two-way data communications between the dialer and the minicomputer. It ships data on prospects to be called to the dialer and, after the call sequence is complete, ships results back to the AS/400.

Davox/400 software, which is available now, costs $5,000 for each AS/400 license. Pricing on the CAS 1500 starts at $49,000.



Firm combines switched lines for videoconferencing

Unique setup satisfies higher bandwidth need.

By Ellen Messmer
Washington Correspondent

NEW YORK — Insurance broker Willis Corroon Corp. recently installed a novel videoconferencing network that enables the user to pool a series of switched lines to provide high bandwidth for videoconferences.

The network, which is Willis Corroon's first attempt at videoconferencing, will help the firm cut travel expenses and increase productivity.

> MCI officials said combining 12 switched 56K bit/sec lines for videoconferencing service represents an industry first.
>
> ▲▲▲

Instead of relying on leased lines to carry video traffic, the user opted to piggyback its videoconferencing traffic onto an existing MCI Communications Corp. Vnet virtual private network that currently handles the company's voice traffic.

Willis Corroon worked with MCI to allow an Ascend Communications, Inc. Multiband Bandwidth-on-Demand Controller on the user's premises to dial up an MCI point of presence and request 12 switched 56K bit/sec lines to a remote site. Multiband controllers on each end of the circuit synchronize the switched calls to create a virtual circuit operating at 672K bit/sec to handle video feeds (see graphic, this page).

MCI officials said combining 12 switched 56K bit/sec lines to create a single pipe for videoconferencing service represents an industry first.

"Willis Corroon has a very high bandwidth requirement for videoconferencing," said Joe Noel, MCI's switched 56K bit/sec product manager.

Prior to beginning the videoconferencing trial, Willis Corroon had already used T-1 access lines for data transmission at several of the company's locations but opted for the current setup to take advantage of Vnet usage discounts, according to Tom Farley, assistant vice-president of telecommunications at the company.

Willis Corroon, which is an insurance provider to corporate clients in the health, petroleum and government industries, installed a Harris Video Communications Systems, Inc. Anamix coder/decoder (codec) operating at 672K bit/sec in its New York headquarters as well as its Nashville office.

In order to deliver the necessary bandwidth to the codecs, Willis Corroon installed the multiband controllers at each site to synchronize the 12 switched 64K bit/sec lines.

According to Farley, when the multiband controller establishes a session on the Vnet private net, "It looks like a Vnet telephone call."

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AT&T users worry about future of ISN

Customers raise questions about service, sales but are hopeful about upcoming enhancements.

By Paul Desmond
Senior Editor

AT&T's recent decision to shift responsibility for its Information Systems Network (ISN) data networking product to a different group within AT&T has users concerned about sales and support but hopeful about future enhancements for the product.

ISN product development, marketing, management and sales officially moved April 1 from AT&T Computer Systems to AT&T Network Systems Group. But users are still unsure exactly what the move means. Some are worried that service will suffer and they'll lose leverage by having to deal with multiple AT&T sales representatives.

At the same time, users\are hopeful that the Network Systems Group will show more interest in ISN and invest the money required to produce needed enhancements, such as support for direct fiber links to more types of computers and a higher speed backplane.

ISN is a packet-based virtual circuit switch that links to remote concentrator devices supporting connections to terminals and hosts. Some AT&T computers can also be directly attached to the switch via fiber. Additionally, ISN can be used for terminal-to-host access and to bridge local-area networks.

Stephen Patrick, president of the Network Users Group-AT&T (NUGATT) and director of computing services at Bradley University in Peoria, Ill., voiced his concerns about the ISN move to the Network Systems Group on the front page of the most recent NUGATT newsletter.

For example, Patrick warned that the move could mean differ-

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New Amnet protocol offers higher performance rate

By Eric Smalley
Senior Editor

FRAMINGHAM, Mass. — Amnet, Inc. recently released a protocol for its Nucleus line of wide-area network switches that company officials said provides a 50% to 75% performance boost over the its current internodal protocol.

The new protocol, called Fast Internodal Trunk Protocol, mirrors the concept of frame relay except that it is not a host system-to-network protocol, according to Robert Machlin, Amnet vice-president of marketing.

The Fast Internodal Trunk Protocol uses a subset of the X.25 Link Access Procedure (LAP) B, company officials said.

Like frame relay, the new protocol does not perform error correction functions, only error detection, Machlin said. Error correction functions can be eliminated from the protocol only if the transmission lines are reliable and if the host systems handle error management.

"If you can make those assumptions, the protocol doesn't have to do as much," he said.

The Fast Internodal Trunk Protocol is available as a software-selectable option for the company's Nucleus 7400 and 7500 Network Switches. It can be used on a link-by-link basis, according to company officials.

The protocol is meant for use with T-1 and E-1 lines that are assumed to be reliable. The Nucleus switches can be used with lower speed transmission lines.

The Fast Trunk Internodal Protocol is available now at no charge for Amnet customers who subscribe to Amnet's software service.

Larger packet support

Separately, Amnet has announced that its Nucleus Network Switches can support a larger packet size as a means of reducing processing overhead for host systems. The Max-Packet feature allows the switches to support packet sizes of up to 4,096 bytes.

Host systems are often required to segment packets into multiple smaller packets that the network can handle, according to Amnet officials.

The Nucleus 7000 Series switches can now handle packet sizes of 16, 32, 64, 128, 256, 512, 1,024, 2,048, and 4,096 bytes.

AT&T users worry about future of ISN

continued from page 17

ent AT&T sales groups would be vying for the same business with competing offerings. One group will be pushing Starlan, for example, while the other sells ISN.

"I think I had a fair amount of clout when I had one salesman because he knew that even though I might be pestering him about ISN, we spent half a million dollars in computers a year," Patrick said.

Bob Donnelly, district manager of networking products in AT&T's Network Systems Group, countered that the ISN sales staff will now be more focused. "If people are distracted by other things in their sales bag, that could be just as bad," he said.

There is also confusion over which group will support ISN. Some users said they were told they would not continue to be supported by the Computer Systems staff unless they had other AT&T data equipment, meaning they would have to break in new support people.

But Donnelly said that is not the case. All service and support for ISN is now with the Network Systems Group unless users request otherwise, in which case, special arrangements can be made at no extra charge. Also, a new 800 number will be available as of Aug. 1 that customers can use to order ISN parts.

On the positive side, users and Donnelly agreed that the move could mean ISN will see some enhancements.

"ISN really hasn't been doing anything under the Computer Systems group because they gave up on it two years ago," Patrick said.

The Network Systems Group, on the other hand, has responsibility for products based on technology similar to ISN but serve different market niches.

One is Datakit, a virtual circuit switch with an 8M bit/sec backplane that is targeted at carriers. In addition, the group last year announced the BNS-2000, a fast packet switch targeted at carriers that operates at up to 155M bit/sec. It supports such interfaces as Switched Multimegabit Data Service, frame relay and Integrated Services Digital Network.

"Computer Systems was pursuing a strategy that emphasized client/server computing," said Donnelly, who moved along with ISN from Computer Systems to the Network Systems Group. "The terminal-to-host capability of ISN didn't match up with that strategic direction."

If enhancements do not come, users said, ISN will likely be phased out of their networks during the next two or three years. For example, one ISN user who requested anonymity said the 8.64M bit/sec backplane speed of ISN was always his biggest concern. His company is using ISN to bridge about 60 LANs, which are a mix of 1M and 10M bit/sec Ethernets.

"If you were to move the backplane speed up to 100M or 200M bit — something on the order of FDDI — then you would be able to use ISN more effectively for the backbone," the user said.

Instead, his company opted to employ two large Cisco Systems, Inc. routers — which it bought from AT&T Computer Systems — in its data center. The routers are configured to act as a backbone interconnecting the company's LANs, and they support links to the ISN.

Ten smaller Cisco routers in remote sites will feed into the routers at headquarters. The ISN will continue to be used for bridging LANs but will not grow.

"The ISN will be useful for another two or three years, and we'll slowly replace it with routers," the user said.

puters and hosts in remote sites. "An ideal situation would be if they could enhance those remote concentrators to support frame relay," he said.

> Users and Donnelly agreed that the move could mean ISN will see some enhancements.
>
> ▲▲▲

He noted that he would like to salvage parts of the ISN, such as the concentrators that support the terminals, personal com-

That would enable users to employ the concentrators with a frame relay service or over a private frame relay network and link them to a router or ISN at a central site.

When asked if such an enhancement may be provided, Donnelly replied, "I don't see it not happening. I don't want to comment on exactly how we'll get there, but that's the general idea behind broadband networking."

Also, he defused long-standing rumors that Datakit and ISN would be merged into one product. "We tried that once," he said.

The difference in bus speed, although it appears slight, means the two products use different clocking, allocate bus bandwidth differently and have incompatible interface modules. Those and other issues would make merging the products too expensive a proposition, he said.

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NO U-TURN

Rip and Run

THE STRAIGHT-PAPER-PATH,

Firm combines switched lines

continued from page 17

The company selected high-bandwidth videoconferencing equipment in order to get the additional features that high-speed codecs can deliver, such as the graphics and windowing features of the Harris Anamix. "The [Harris] codec resides in a personal computer," Farley said. "You can transfer files when you're videoconferencing and pass files back and forth between the two PCs."

The windowing function of the system allows display of graphic images in conjunction with live face-to-face interactions.

The system also has full-duplex voice so that people can speak naturally without creating sound distortions, a problem that can crop up when people are interrupting one another.

The initial videoconferencing trials between the New York headquarters and the Nashville office began in April and ended last month. According to Farley, the tests went well and, in the future, the company may expand its use of videoconferencing to other locations.

Willis Corroon may also invest in a Harris multipoint bridge, which would allow videoconferencing between eight locations simultaneously. Without the bridge, videoconferencing is limited to point-to-point communications.

Watch Hill touts data compression device for T-1, fractional T-1 lines

By Paul Desmond
Senior Editor

EAST GREENWICH, R.I. — Watch Hill Research, Inc., a start-up based here, last week announced what it claims is the first data compression device designed for T-1 and fractional T-1 lines.

Watch Hill Research's Time Machine line of data compression devices supports compression ratios from 2-to-1 to 6-to-1 on T-1 links, a capability the company said was previously available only for 64K bit/sec or slower lines.

"By putting Time Machine in rather than adding another T-1, users can effectively pay back the installation of Time Machine [from the T-1 savings] in several months," said Matt Lukens, president and chief executive officer of Watch Hill Research. Alternatively, users of a single T-1 can employ the product with a less expensive fractional T-1 line and effectively get the same amount of bandwidth.

Time Machine comes in two models. The T-1/E-1 Time Machine supports T-1 and E-1 lines, while the CFT-1 model supports fractional T-1.

The device attaches to a network between any vendor's local-area network bridge or router and a T-1 data service unit/channel service unit. It supports V.35 and RS-422 interfaces and works with virtually any Synchronous Data Link Control- or High-Level Data Link Control-based protocol, Lukens said.

A variety of routing protocols are supported, including the Point-to-Point Protocol, and support for the Binary Synchronous Communications protocol is due out later this year, he added.

Matt Lukens

Time Machine is based on an internally developed processor designed especially to run data compression algorithms. The design allows Time Machine to operate with a throughput delay of only 1 packet/sec, whereas algorithms based on traditional microprocessors have a delay of several packets per second, Lukens said.

The data compression range of between 2-to-1 and 6-to-1 depends on the type of data content. For example, text files are typically highly compressible, but binary files, such as application program code, are not.

Time Machine can detect T-1 failures and dial up a switched 56K bit/sec circuit for backup. It achieves the equivalent of at least 200K bit/sec of bandwidth from the switched 56K bit/sec link. It can also automatically switch traffic back to the T-1 when the line is up again, Lukens said.

Both Time Machine models are expected to be available in September. A 120-volt version of the T-1/E-1 model costs $11,495, and a 220-volt version costs $11,995. The CFT-1 model costs $9,495 for the 120-volt version and $9,995 for the 220-volt version.

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Circle Reader Service #102

LOCAL NETWORKING

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Worth Noting

"LANalyzer literally walks you through the [analysis] process. If you're in normal run mode, you can hit the 'help' key and get information on how the product works. If you're in test mode, it'll give you information about the environment you're in and suggestions about how to solve problems."

Duane Murray
Vice-president
and general manager
Network Analysis
Products Division
Novell, Inc.
San Jose, Calif.

Netnotes

Cayman Systems, Inc. of Cambridge, Mass., has added Digital Equipment Corp.'s DECnet support to its GatorBox CS series of AppleTalk-to-Ethernet gateways. The GatorBox products currently support Apple Computer, Inc. AppleTalk and Transmission Control Protocol/Internet Protocol.

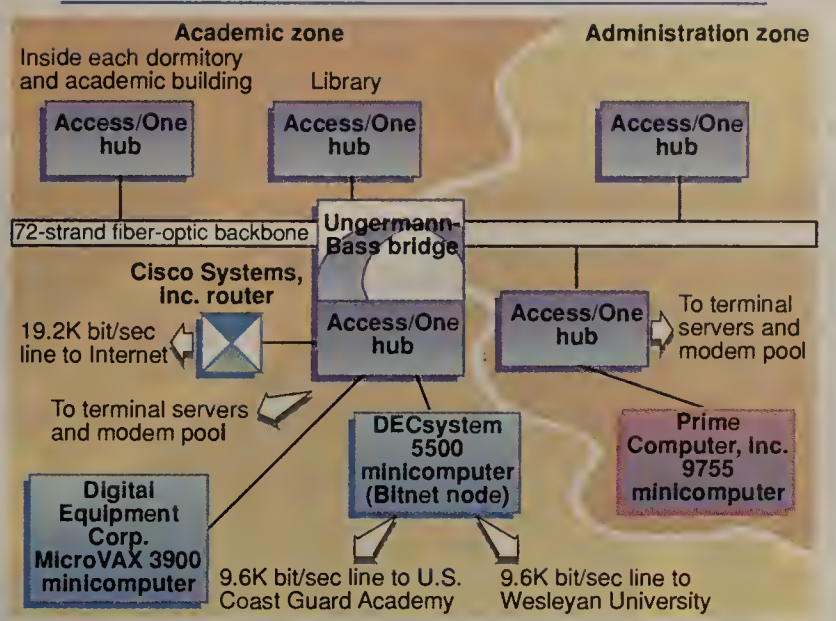
DECnet support will enable the GatorBox line to serve as DECnet Level 1 routers. The DECnet software makes the GatorBox line compatible with DEC's PathWorks microcomputer network software and DECnet emulation software for the Apple Macintosh from Thursby Software Systems, Inc.

The **Business Applications Performance Corp. (BAPC),** a nonprofit corporation formed to provide benchmark testing of microcomputers, was launched last week by Dell Computer Corp., Hewlett-Packard Co., IBM, Intel Corp., Microsoft Corp., NCR Corp., and Novell, Inc.

BAPC will develop and distribute benchmark tests based on available microcomputer

(continued on page 25)

Connecticut College installs fiber net



Small college becomes a campus of the future with a network based on a fiber-optic backbone and Ungermann-Bass, Inc. Access/One hubs that allow the backbone to support LANs, terminal servers and a variety of data terminal equipment.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: CONNECTICUT COLLEGE, NEW LONDON, CONN.

College's new net links all rooms, allows for growth

Fiber net will accommodate FDDI when needed.

By Eric Smalley
Senior Editor

NEW LONDON, Conn. — Connecticut College, a small, private liberal arts college here, has installed a fiber-optic network that gives users access to voice and data services from virtually every room on campus.

The network infrastructure will allow this campus of 2,623 students, faculty and staff to migrate to Fiber Distributed Data Interface as future bandwidth requirements dictate.

"We were at about 1965 in 1987," Makofske said. "The infrastructure was failing."

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The new network will help the college make up for the years it allowed technology to pass it by. "We were at about 1965 in 1987," said Thomas Makofske, director of computing and information services for the college. "The infrastructure was failing."

The college hired Telecommunications Services, Inc., a consulting firm in Waterford, Conn., to help select a vendor for the network. A contract was eventually awarded to SNET Systems, a subsidiary of Southern New England Telephone Co. SNET Systems proposed a network based on Ungermann-Bass, Inc. Access/One hubs and AT&T System 85 G2 private branch exchanges.

Connecticut College is not the first academic institution to wire all of its rooms, but the college is unique among smaller schools for having laid the groundwork to accommodate growth. "We are the first liberal arts college designated by AT&T as a 'Campus of the Future,' " Makofske said.

The college's goal is to provide "an environment that's fully supported by voice mail, and data and video network facilities," he added.

To meet that goal, the college installed a 72-strand fiber backbone with fiber spurs to every building. Within each building, coaxial cable is run up the vertical risers, and twisted-pair wire — four pairs each for both voice and data — is used in the horizontal runs to each room.

In addition to supporting microcomputers and local-area network interconnections, the network supports two academic minicomputers and an administrative minicomputer.

The administrative and academic portions of the net are separated by a bridge in one of the two primary Access/One hubs on the backbone. The bridge keeps academic users from accessing the administrative systems.

There are two Access/One hubs with asynchronous interfaces in each dormitory to link students' microcomputers to the campus network. The college's information systems staff plans to eventually migrate the student users to Novell, Inc. NetWare to-

(continued on page 25)

LANalyzer updated for NetWare 3.11

New version of Novell's analyzer decodes 3.11 protocols, comes with more predefined tests.

By Caryn Gillooly
Senior Editor

SAN JOSE, Calif. — Novell, Inc. last week introduced the latest release of its LANalyzer protocol network analyzer, the first product on the market that will be able to fully analyze traffic on NetWare 3.11 networks.

LANalyzer 3.11 will be able to decode NetWare 3.11 protocols in addition to a total of 12 protocol suites on both token-ring and Ethernet nets.

Novell also added 50 predefined tests to its Application Test Suite and new features to the LANalyzer that together will help administrators more easily locate and solve network problems.

"We basically have brought the tool up to date to support the [NetWare] 3.11 [NetWare Core Protocols]," said Duane Murray, vice-president and general manager at Novell's Network Analysis Products Division, based here.

Murray explained that, for the past three months, NetWare 3.11 customers could not get information about all the NetWare 3.11 protocols.

"There were a number of protocols the previous version of LANalyzer could not decode," Murray said. These protocols include NetWare Core Protocols, which are used to instruct the server to do everything from printing to exchanging files. "The administrator would be able to see it was a [NetWare Core Protocol] packet, but would not be able to get any information [it]."

In addition, he said, there was a gap between the protocols supported under the new version of NetWare — such as IBM's Systems Network Architecture, Open Systems Interconnection and Sun Microsystems, Inc. Network File System (NFS) — and the protocols the LANalyzer could decode. That gap is now filled.

Before this release, the LANalyzer could analyze Transmission Control Protocol/Internet Protocol, Simple Network Management Protocol (SNMP), Apple

(continued on page 24)

Firm bolsters line of LAN mass storage peripherals

By Timothy O'Brien
West Coast Bureau Chief

REDMOND, Wash. — Advanced Digital Information Corp. (ADIC) recently introduced new disk subsystems, LAN tape backup systems and disk coprocessor boards for microcomputers.

ADIC, which worked with Novell, Inc. during the past few years to codevelop disk subsystems, is now broadening its focus by rolling out products compatible with other operating systems, such as OS/2 and Unix.

The company's new S-Series Small Computer System Interface (SCSI) disk drive subsystems are available in single- or dual-drive configurations ranging in capacity from 330M to 1G bytes and can be used with systems running OS/2, The Santa Cruz Operation, Inc.'s Unix, Sun Microsystems, Inc.'s Sun/OS and Xenix. The drives come preformatted and include prewired external connectors for faster installations.

"The new S-Series disk subsystem will function fully with Novell's NetWare but will also provide support for other operating systems," said Ernie Brown, chief executive officer of ADIC.

In the area of tape backup, ADIC has introduced the DATa 2000, an external digital audio tape drive with 2G bytes of capacity. ADIC will bundle the drive with Cheyenne Software, Inc.'s server-based ARCserve backup and restore software, as well as Data Right, its own workstation-based backup software.

Adapter takes control

Recognizing that I/O limitations of personal computer buses cause disk throughput limitations, ADIC also released a 32-bit BusMaster SCSI host adapter for machines based on the Micro Channel Architecture (MCA).

The adapter takes control of the system's bus and transfers data directly to and from system memory, speeding disk performance and lessening the processing load on the host system.

With the release of the MCA BusMaster SCSI adapter, ADIC

(continued on page 24)

LANalyzer updated

continued from page 23

Computer, Inc.'s AppleTalk Phase 1 and 2, Digital Equipment Corp.'s DECnet Phase IV, Xerox Corp.'s Xerox Network System and other Novell traffic.

With the new release, the product's analysis capabilities include NFS, SNA, OSI, Banyan Systems, Inc. VINES, Microsoft Corp. Server Message Block (SMB)/ Network Basic I/O System and NetWare 3.11 environments.

According to Murray, the real advantage of the new release is not necessarily the additional protocol support, but the products' new features and tests.

In fact, according to a Novell spokesman, the capability to decode protocols is almost secondary to explaining the data. It's nice to have the raw data, he said, but that data is of no use if the administrator does not know how to interpret it.

Dan Kohner, network services team leader at the University of Texas' M.C. Anderson Cancer Center in Houston, a beta site for the product, agreed.

"Most decoding systems simply display huge amounts of raw data, leaving the interpretation to the user," Kohner said. "LANalyzer extracts and interprets only what we need to see, then uses plain language to call out current or potential problems."

These features are supported by the product's Application Test Suite, a suite of predefined tests, each of which capture network traffic, filter specific types of packets and interpret the results accordingly.

According to Novell, these applications range from varifying connectivity to the network to troubleshooting overloaded file servers or loose network interface connections.

The test suite was available with the previous version of the LANalyzer, but it now includes more than 120 predefined test routines. Some of the new tests will help solve packet broadcast storms, find routing problems and pinpoint performance problems, according to Steve Dauber, product marketing manager of the Network Analysis Products Division.

> "LANalyzer extracts and interprets only what we need to see," Kohner said.
>
> ▲▲▲

Besides the new protocols and tests added with this release, new features include summary display mode, which will give users an on-line description of each packet and its function; sorted station monitoring, which will let users sort through continuously captured traffic according to certain criteria; and SNMP Management Information Base (MIB) support, which will let administrators add MIB extensions to the LANalyzer.

With the new release, prices for the LANalyzer will go up. Versions for Ethernet or token ring will cost $12,500, up from $9,980 for the Ethernet version and $11,980 for the token ring version. The price for the combined Ethernet and token ring version will remain at $19,980. LANalyzer 3.11 will be available by the end of this month.

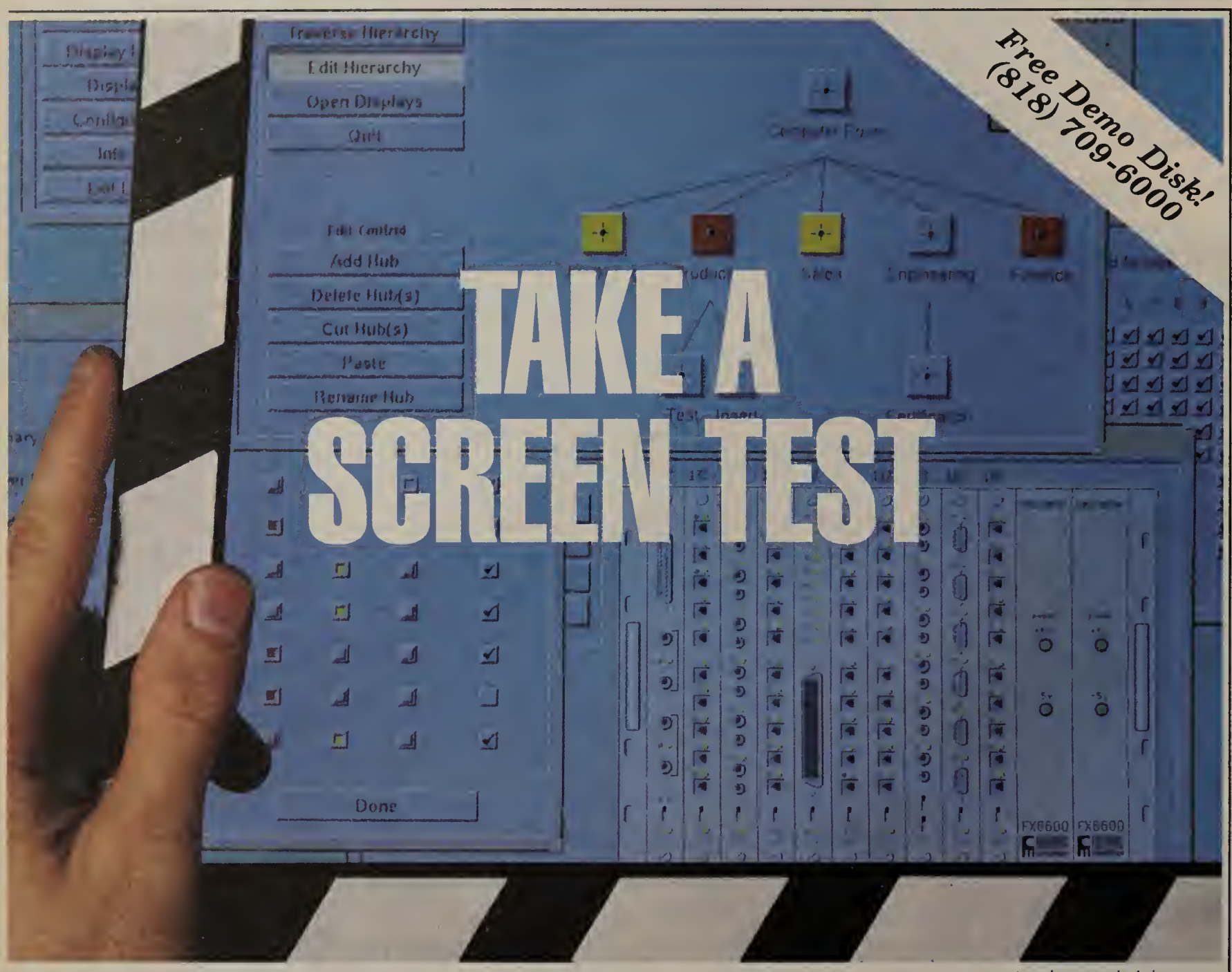
Firm bolsters peripherals

continued from page 23

now has adapters for the three leading personal computer architectures: MCA, the Industry Standard Architecture and the Extended Industry Standard Architecture.

The S-Series subsystems range in price from $3,695 for a single-disk, 330M-byte unit to $11,395 for a dual-disk, 1G-byte unit. Prices for the DATa 2000 range from $5,995 to $7,795, depending on configuration. The new MCA BusMaster adapter costs $895.

All products are available now.



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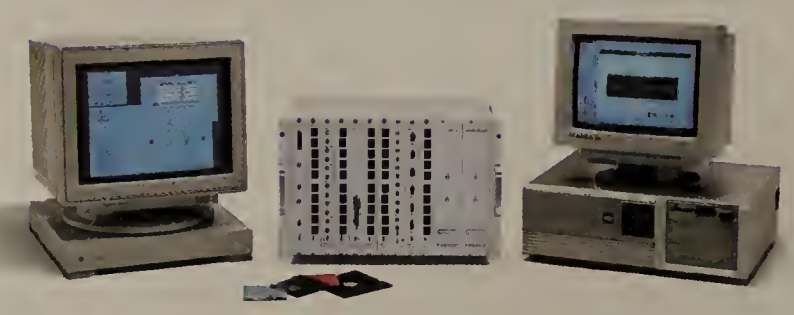

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Circle Reader Service #120

Digital Products' print server lets Novell nets output pages faster

LANSprint for NetWare lets users print 8 pages per minute.

By Caryn Gillooly
Senior Editor

WATERTOWN, Mass. — Digital Products, Inc. recently introduced a hardware/software print server for Novell, Inc. local-area networks designed to overcome printing bottlenecks.

Printing speed — particularly for items such as graphics — is generally limited by LAN servers and not by the printers themselves, according to Cornelius Peterson, president of Digital Products, based here. "Printers can print faster than the network can go," he said, pointing out that servers can only process a limited amount of information in a given time period.

Graphics printing with graphics packages, such as Lotus Development Corp.'s Freelance and Software Publishers Corp.'s Harvard Graphics, is too slow to take advantage of fast printers, such as Hewlett-Packard Co.'s IISi and IIIP laser printers.

"A [Novell] NetWare file server can transfer a 500,000-byte document in about 100 seconds." Peterson said. "That's about half a page a minute."

Using Digital Products' new LANSprint for NetWare Version 3.0, the network would be able to print eight pages per minute, he added.

The product consists of a NetWare Loadable Module software module and a board that goes into a workstation to which the printer is attached.

The board acts as a coprocessor, offloading from the server to the workstation about 90% of the processing tasks associated with printing.

According to Peterson, the increasing use of graphics printing on LANs is slowing networks by straining servers.

"Even if only one person on the network is printing a graphics document, he's tying up the network," he said. Although the current version of LANSprint is only for Novell environments, the company will bring out similar products for Microsoft Corp.'s LAN Manager and Digital Equipment Corp.'s PathWorks nets in September or October.

Available now, LANSprint for NetWare 3.0 costs $495 for a single-port board and $695 for a dual-port board. Free upgrades are available for those currently using LANSprint for Novell's NetWare Version 2.15.

College's new net links all rooms

continued from page 23

ken-ring LANs that will be connected to the backbone through the hubs, according to Timothy Groome, the college's coordinator of network services.

The school's voice network currently supports 2,500 voice lines using the AT&T switches. Each dorm room has a telephone, and students are required to pay for the college's telephone services, which include a voice mail system from Octel Communications Corp.

The campus network also has the capacity to support two-way video from any campus location, but the college has not decided which video services to support, Makofske said.

The network is being used to support a campuswide security system as well. When users call the campus safety department by dialing 111, their location is displayed at the security guard post. Students must also dial their personal identification number and a code number on a phone at each dormitory door to enter the building.

In addition to improving internal communications, the college's net will improve communications with parties outside of the campus. Connecticut College has been on Bitnet, the national academic network, for three years, and will become a node on the Internet next month.

"The college is very committed to international relationships and studies," Makofske said. "We'll be using our telecommunications and networks to make the college more of a global institution."

Netnotes

continued from page 23

applications. Benchmark tests for network environments will cover Novell's NetWare, Microsoft's LAN Manager, IBM's LAN Server and Banyan Systems, Inc. VINES network operating systems.

WorkGroup Technologies, Inc. last week released Version 3.0 of its Configuration Management System (CMS). CMS is software for managing access to and creation of documents shared across multiple platforms and applications. The software has been updated to more easily integrate third-party applications and to allow users to create both hierarchical and coupled relationships between documents.

CMS, which runs on Sun Microsystems, Inc. workstations, costs $16,000 for an eight-user license and $24,500 for a 16-user version.

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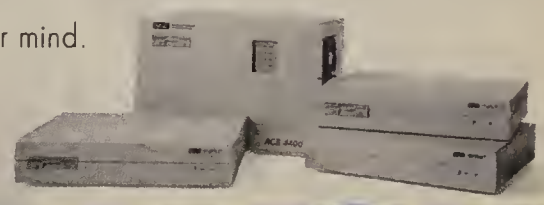

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Circle Reader Service #115

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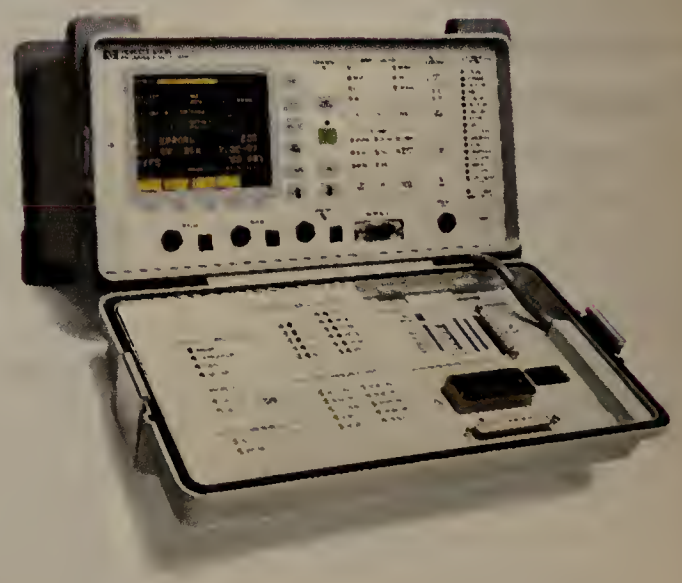

There is a better way.

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Circle Reader Service #122

Dialogue

What's your view of the recently proposed alliance between IBM and Apple Computer, Inc., which is aimed, at least in part, at better integrating Macintoshes into IBM networks?

"I have mixed feelings about the alliance. My first reaction was great surprise that the two companies agreed to team up. If the deal pans out, it's the best thing that could happen for me and would resolve a lot of the compatibility problems in my network.

"But I worry that it might turn out to be another OS/2. IBM was working on developing OS/2 with Microsoft, and then they just dropped it. I wonder if this is going to last. I don't know what to expect as a user. Are [Apple and IBM] really ready for this venture? Everything is premature right now."

Rod Padilla
Systems analyst
Georgia State University
Atlanta

"We're looking to consolidate all the bits and pieces we currently have — CAD, VAXes, a minicomputer and Macintoshes — into a single network. Until now, it's been apples and oranges. The proposed Apple and IBM platform would be very attractive to us in trying to tie all the pieces together."

Timothy Turner
Supervisor of data processing
Contra Costa Water District
Concord, Calif.

"The first reaction from everyone is total surprise because no one expected a serious agreement to come out of IBM-Apple negotiations.

"The sense I get from many users is a certain uneasiness because they have no idea how [an alliance] will affect their jobs. My own feeling is that there have been other agreements similiar to this that Apple has entered into where little or nothing has happened. It also appears that IBM is taking this more seriously than Apple in some ways, such as in terms of how many people and other resources they're dedicating to work on this proposal."

Stephen Costa
Executive director
Berkeley Macintosh Users Group
Berkeley, Calif.

Network exec plays politics to get key project approved

Cost-saving effort a tough fight for Mass. manager.

By Wayne Eckerson
Senior Editor

BOSTON — Playing corporate politics is a standard part of any network manager's job. But steering a net project through a state legislature can test the mettle of even the most streetwise net professional.

Len Evenchik, director of communications for the commonwealth of Massachusetts, knows that only too well. It took Evenchik and a staff of three network analysts a year — and a lot of persistence — to gain legislative and executive approval for a network project that could potentially save the financially troubled state millions of dollars.

"The technical work [in the project] was easy compared to the political challenges," Evenchik said.

In February 1990, Evenchik devised a plan to hire outside consultants to perform a top-to-bottom audit of all network equipment and services used by the commonwealth in order to uncover any billing errors or overpayments.

The value of that plan was confirmed the following month when Evenchik and his staff decided to audit the state's Centrex services to jump-start the project. That audit revealed that New England Telephone and Telegraph Co. had overcharged the state by more than $6 million for Centrex over the previous five years ("N.E. Tel pays out millions, rectifies billing blunder," *NW,* July 2, 1990).

"The Centrex audit confirmed the importance of undertaking a comprehensive audit," Evenchik said.

Spending on Centrex accounts for about 16% of the commonwealth's total expenditure on network services and equipment, which averages $50 million annually, Evenchik said.

As soon as Evenchik began drawing up plans to issue a request for proposal for the audit project, he ran into problems. Network auditors typically charge clients a certain percentage of the savings they identify, often called a contingency fee. But Massachusetts purchasing guidelines prohibit state agencies from signing contracts unless the price of a service is known and agreed upon ahead of time.

Evenchik didn't confront this

(continued on page 30)

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

Employment levels up. For the first time in more than two years, there has been an increase in the number of U.S. companies planning to expand their work force, indicating that the recession may be easing. That's according to a quarterly survey of 1,500 businesses conducted by Manpower, Inc., a leading temporary help agency.

"The Employment Outlook Survey" shows that 22% of U.S. firms plan to hire new workers during the summer months, while 10% plan to shrink their payrolls. This represents a sharp upturn from the April-to-June quarter, during which employment figures fell to 1982 recession levels. During that period, 18% of firms expected to expand their work force and 13% planned reductions.

Expert advice. The Computer and Automated Systems Association of the Society of Manufacturing Engineers (CASA/SME) publishes a series of monographs that offer a refreshing change from dry tutorials on information technology.

Several times each year, CASA/SME brings together half a dozen or more experts in a certain area for a roundtable discussion. CASA/SME records the discussion and appoints another expert in the field to summarize the group's findings and add pertinent background information, graphics and reference material.

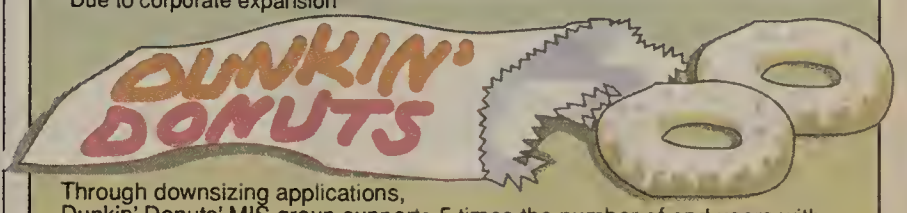
This spring, for example, CASA/SME published two monographs based on roundtable discussions held this year: "Issues

(continued on page 32)

Dunkin' Donuts rearchitects MIS

	1988	1991
Time spent developing applications	3 to 6 years	9 to 12 months
Number of dumb terminals	60	45
Number of LAN-based PCs	0	170
Number of end users supported*	100	500
Number of MIS staffers	32	29

* Due to corporate expansion



Through downsizing applications, Dunkin' Donuts' MIS group supports 5 times the number of end users with less staff, and it reduced applications development time by at least one-third.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: DUNKIN' DONUTS, INC., RANDOLPH, MASS.

Dunkin' Donuts wins through downsizing

Firm moves from host to mini, then LAN to improve data access, speed up application deployment.

By Maureen Molloy
Staff Writer

RANDOLPH, Mass. — Several years ago, David Bennett began fielding a growing number of complaints from end users dissatisfied with the slow deployment of new applications.

As a result, Bennett, MIS director for Dunkin' Donuts, Inc., devised a plan to move all applications development off a Wang Laboratories, Inc. minicomputer and onto an Ethernet local-area network supported by a Sun Microsystems, Inc. 4/490 server. The migration to a LAN platform has lowered computing costs and has vastly improved information services by reducing the backlog in applications development.

"We've gone from a classic mini environment where users run applications from their terminals to one where users now have personal computer-based tools that allow them to resolve their own information needs using their own hardware," Bennett said.

Serious bottlenecks were occurring in the large systems environment because it took too long to develop applications in COBOL, according to Bennett. The company also found it difficult to modify applications when user needs changed.

These bottlenecks and low customer satisfaction ratings convinced the MIS department to put more control directly into users' hands. The group redeveloped applications for the LAN environment and gave end users a suite of personal computer-based applications and data manipulation tools. Today, users can develop their own applications rather than waiting for MIS.

"Our whole objective is to provide a network that delivers the data and the tools to manipulate that data, and — together with the proper training and support — let them devise their own information solutions," he said.

In addition, applications that still need to be developed centrally can be prototyped and built more quickly using fourth-generation languages and other productivity tools. Applications that once took between three and six

> Today, users can develop their own applications rather than waiting for MIS.
>
> ▲▲▲

years to develop are now being delivered in less than a year.

Dunkin' Donuts' former computing platform comprised a Burroughs Corp. mainframe. The firm's MIS department began moving applications off the mainframe and onto a Wang 7310 minicomputer in the past decade.

In 1988, the firm began moving applications onto the Sun server. The Wang minicomputer will be retired within the next three years as the three applications still housed on it are migrated to the server.

The current backbone net-

(continued on page 30)

Open systems.

Everyone agrees they're

No one's debating whether open systems are a good idea, but you'll hear plenty of discussion about what open systems *are*.

Some insist, for example, that an open system is a UNIX® system. But to others it's whatever it takes to get their different operating systems, networking protocols and databases working as one, and the sooner the better.

That's why IBM views open systems so openly. To us, they begin less with particular technologies and more with the needs of your business.

The real goal is to liberate information that's trapped around your company, so more of your people can use it more easily, and to open commu-

good, but not everyone agrees how to get there.

nications with customers and suppliers, who no doubt planned their systems without thinking about yours.

And of course, you need to accomplish all this without scrapping your existing multivendor investments.

So the paths to open systems will vary, but there's one thing that won't—consistent industry standards. IBM is fully committed to open systems, so we're equally fervent about standards.

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Exec plays politics to get project approved

continued from page 27

problem during the audit of the Centrex services because an internal telecommunications staffer conducted that project.

As a result, Evenchik had two options: He could either hire network analysts as state employees to perform the audit or try to modify the restriction against contingency fee arrangements.

Since the state is trying to reduce costs and personnel in an effort to ease its current fiscal problems, Evenchik ruled out hiring new staff. He would have had to hire at least a dozen experienced auditors to review the state's expenditures on network services and equipment.

Furthermore, it not only would have been difficult to find net audit specialists, but they would probably have to have been laid off once the project was completed.

But lifting the restriction against contingency fees proved even harder than Evenchik anticipated. Despite numerous memos, presentations and formal as well as informal conversations with budget analysts and legislative staffers, Evenchik and his staff couldn't make much headway.

Part of the problem was that then-Governor Michael Dukakis had recently announced he would not seek reelection and was preoccupied with the state's ballooning deficit.

"Despite the potential savings it offered, the proposal did not receive the attention it needed in the waning days of the Dukakis administration," Evenchik said.

When William Weld was elected governor and assumed office in January, doors began to open. "People began taking a fresh look at things which worked to our advantage," Evenchik said.

Evenchik and his staff gained invaluable support from staff members in the Senate Ways and Means Committee who helped incorporate the audit proposal into supplemental legislation that was adopted by the House and Senate and approved by Governor Weld in February. That legislation contains a clause that allows the commonwealth to procure network audits on a contingency fee basis.

Starting in March, a procurement selection board chaired by Evenchik drew up the network audit RFP, which was issued two weeks ago. The RFP calls for a three-year contract with as many as three firms. Those selected will review the commonwealth's expenditures on switched and dedicated voice and data services, as well as charges for leased voice and data communications equipment.

While most network auditing firms sign contracts in which they are allowed to keep 50% of the savings they identify, Evenchik is hoping the bidding process will yield more competitive pricing. "This really is a huge project, so we hope firms will charge less than 50% of the total refund," he said.

Since the state's network has never been audited, the winning firms will be free to review records as far back as they care to go, Evenchik said. The audit will cover network equipment and services used by all state agencies. In addition, the auditors will construct a data base that contains an inventory of the equipment and services used by the state.

Dunkin' Donuts wins through downsizing

continued from page 27

work at the headquarters here is an Ethernet LAN anchored by three Banyan Systems, Inc. servers, the Sun server and three Sun workstations. About 170 personal computers on an Arcnet LAN are tied into the Banyan servers.

"We were responding to what we were seeing in the user community," Bennett said. "The PC explosion was going to happen whether we controlled it or not, and we felt it would be more costly to the company, in terms of fragmented networks, if we didn't coordinate the effort."

Dunkin' Donuts franchises will soon be linked to the corporate net.

End users, ironically, are also the primary obstacle in a smooth migration to a distributed platform. The learning curve required for users to solve their own computing problems is an impediment the MIS group must always keep in mind, he added.

At the same time the firm is downsizing applications, it is also expanding networking services to remote users throughout the corporation. Bennett will begin linking personal computers in six national zone offices to headquarters through an X.25 net, allowing users in remote offices to share data with headquarters.

During the next three years, the company will also link its more than 2,400 franchises to the corporate net via an X.25 packet-switched network.

"The franchise owner will participate more fully as an internal employee," Bennett said. "Things such as quality assurance alerts and product development status reports that are currently delivered through memos and telegrams will be accommodated through the corporate network."

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141	142	143	144	145	146	147	148	149	150

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Publisher uses ISDN ANI to cut costs, improve customer service

By Bob Wallace
Senior Editor

OLD TAPPAN, N.J. — Simon & Schuster, Inc. recently said it has improved customer service by using ISDN's automatic number identification (ANI) feature to quickly route incoming calls to agents responsible for various sales regions.

The book publisher is among the first customers to use ANI to enable an automatic call distributor (ACD) to route calls to agents by mapping the area code of the incoming call to an agent responsible for that region. The setup should enable the publisher to save $55,000 a year in 800-number usage charges and staff expenses.

"ANI has helped us raise the level of customer service we provide while lowering costs," said Rick Bates, Simon & Schuster's vice-president of customer service. "Customers get to our agents quicker and, therefore, spend less time on the phone."

Before Simon & Schuster began using ANI six months ago, stores dialing the 20-agent customer service center here to check orders were greeted by a 29-second recording prompting them to key in their area code. Callers were then routed to the customer service agent responsible for that area code.

However, callers with rotary phones could not key in their area code and were transferred to an operator, who asked for the data and passed the call to the appropriate agent. In 1990, the operator handled 56,000 rotary-dialed calls — 15% of all incoming calls received.

Late last year, the firm decided the 29-second delay was too long for customers to reach the appropriate agent. Once connected to an agent, callers spent an average of 2.5 minutes obtaining information.

It then decided to begin using AT&T's Integrated Services Digital Network Primary Rate Interface service and its ANI feature, which delivers the caller's telephone number to the called party and enables an existing ACD to route incoming calls.

But before it could begin acting on ANI, Simon & Schuster had to set up special routing tables in the Aspect Telecommunications Corp. ACD, Bates said. The tables enable the switch to match the area code from an incoming call's ANI with the extension of the appropriate agent.

Bates estimated that dropping the 29-second recording in favor of ANI will reduce Simon & Schuster's 800-number usage charge by $30,000 a year based on a projected call volume of 400,000 calls annually. The new process also has eliminated the need for the operator to handle calls manually, which results in a $25,000 salary savings.

"We're pleased with ANI, and our customers are pleased with the new process," Bates said.

> "ANI has helped us raise the level of customer service we provide while lowering costs," Bates said.
>
> ▲▲▲

Although ANI has helped route callers to Simon & Schuster agents faster, the book publisher has no immediate plans to write an application that uses ANI to retrieve customer profiles from its IBM 3090 mainframe here. "It's an expensive proposition," Bates said.

Simon & Schuster hopes to eventually use ANI with a planned voice response unit-based system that will automate the processes of checking stock, verifying prices and ordering books, he added.

Customers would dial an 800 number, key in a bookstore code and then be prompted through the ordering process. "Customers do not need to speak to a person to order books," Bates said. "And they could use the system 24 hours a day, which would be especially attractive for stores in other time zones."

Executive Briefs

continued from page 27

in Migrating to Teamwork" and "Expert Systems: How to Get Started."

Roundtable participants for the teamwork monograph included management experts from companies such as American Express Travel Related Services Co. and Motorola, Inc., as well as university professors and consultants. The monograph addresses strategies for implementing a team approach based on the roundtable discussion. It also contains a recommended reading list of related articles.

The monograph on expert systems is geared toward people who understand expert systems and want to start using them. It stresses that expert systems must be built, tested and revised in stages. It also describes methods for acquiring knowledge from in-house experts.

The monographs cost $8.50 for SME members and $9.50 for nonmembers.

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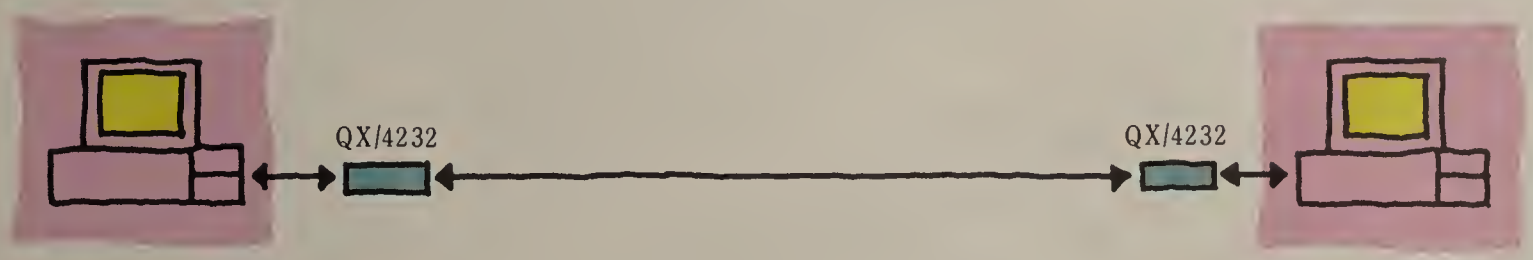

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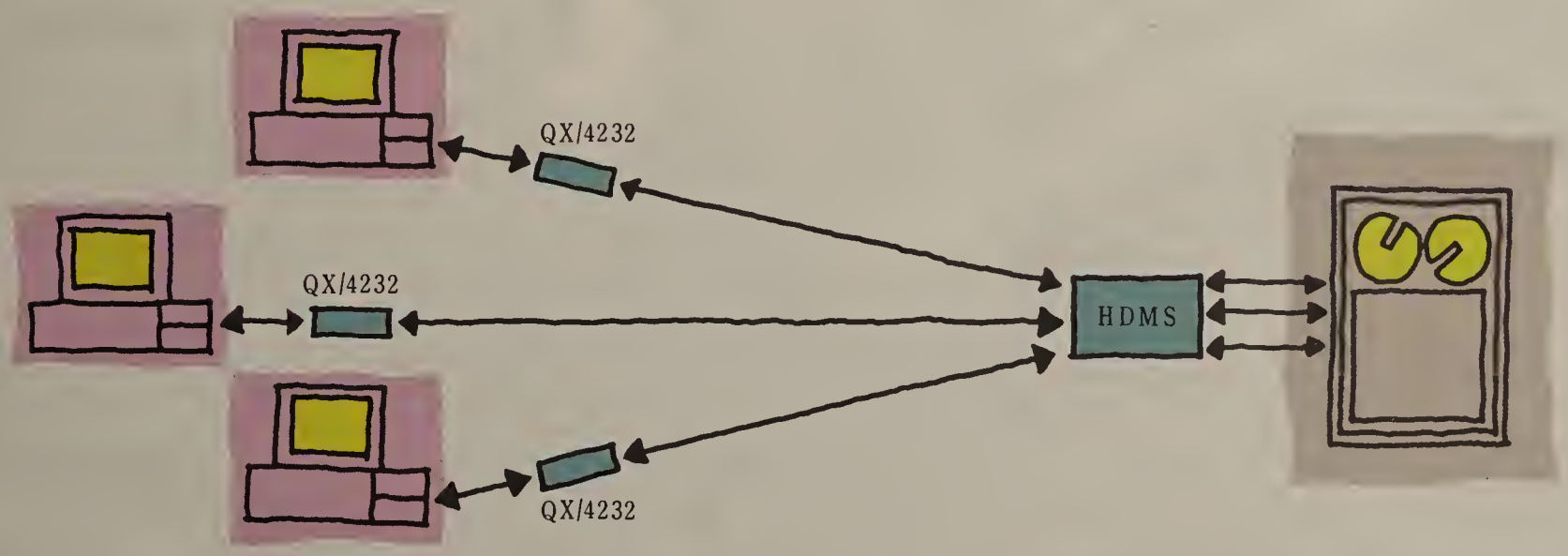

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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

A company spokesman recently disclosed that **BT North America, Inc.** will be at least three months late in rolling out its global frame relay service.

Initially, the service, which was announced in January, was to have been generally available in June. Now, according to the spokesman, BT North America will not roll out its frame relay service until September.

The spokesman said the commercial launch has been pushed back because of equipment installation delays. BT North America also has not disclosed how much it will charge for the service.

The spokesman did say, however, that one beta user has signed up for the frame relay service.

In the initial implementation, BT North America will offer frame relay service from 160 U.S. nodes. The company plans to extend the service into France, the U.K. and other countries.

Northern Telecom Europe, Ltd., the European division of Northern Telecom, Inc., last week said operations had commenced on the largest private Integrated Services Digital Network in Europe.

The private ISDN net is operated by BASF AG, which is based in Ludwigshafen, Germany.

The network, which is based on Northern Telecom Meridian 1 private branch exchanges, supports approximately 28,000 telephone extensions within Germany.

Canada's ban on bypass via U.S. loop lacks enforcement

Restrictions on net traffic will be difficult to police.

By Barton Crockett
Senior Editor

OTTAWA — Even though its new rules sound dramatic, a recent move by Canada's principal regulatory agency to prevent international bypass may be little more than a paper tiger.

Observers say a new rule enacted by the Canadian Radio-television and Telecommunications Commission (CRTC) late last month, which bans users and resellers from routing public network traffic from Canada to the U.S. and then back to Canada or overseas, is probably not enforceable.

In that rule, the CRTC failed to specify how bypass violations would be detected. Observers say that is because detection is virtually impossible.

"The CRTC is not putting any teeth into this," said Lis Angus, executive vice-president of Angus TeleManagement Group, a network consulting firm in Pickering, Ontario.

Angus said U.S.-based companies, for example, could still easily route public net traffic from Canadian offices to U.S. private nets and then back to Canada because it will be neither technically nor economically feasible for Canadian carriers to trace the routing of every U.S. call.

Users route public bypass traffic through the U.S. because it enables them to pay U.S. carrier rates, which are far less expensive than Canadian rates. Some users say the savings from this kind of bypass can total more than 50% over Canadian service charges.

However, the CRTC, in a move designed to protect Canadian carriers from U.S. competition, said most major carriers in the country — including Bell Canada, British Columbia Telephone Co.,

(continued on page 38)

Users get switched access to SprintNet data network

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — US Sprint Communications Co. recently announced a new service designed to give customers immediate switched access to the SprintNet data network while they wait for dedicated access facilities to be installed.

Fast Start, available through Sprint International in France, Japan, the Netherlands, Switzerland and the U.K., enables Sprint International customers to have virtually immediate dial-up access to SprintNet, even though their local carrier may take as long as three months to install dedicated local-access lines.

Connecting near you

For a $500 onetime charge, Fast Start customers receive a 9.6K bit/sec Octocom, Inc. modem to provide a dial-up connection to the nearest SprintNet access center. Usage charges are separate.

The modem can usually be installed within seven days, accord-

(continued on page 36)

Provisions of CCITT's one-stop shopping proposal

Purpose:

- To define how carriers should work together to provide a limited set of one-stop shopping services.

Carrier relationships defined:

- **A coordinating administration** is selected by user as a single point of contact for provisioning and administering a global private net.
- **A participating administration** works through a coordinating administration to provide international private-line services to users.

One-stop shopping services supported:

- **Single-point ordering:** Coordinating administration orders circuits for user from participating administrations.
- **Single-point billing:** Coordinating administration provides user with a single bill for services from participating administrations.
- **Coordinated provisioning:** Coordinating administration oversees circuit provisioning process for user.
- **Single-point fault reporting:** Coordinating administration is user's principal contact for investigating and clearing faults on a global net.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: CONSULTATIVE COMMITTEE ON INTERNATIONAL TELEPHONY AND TELEGRAPHY

CCITT to endorse one-stop shopping

Approval of proposed guidelines could spur many foreign carriers to back concept for global nets.

By Barton Crockett
Senior Editor

GENEVA — At a meeting here later this summer, the CCITT is expected to approve the first global guidelines for the provision of one-stop shopping services for international private networks.

Approval of the proposed guidelines is expected to spur many foreign carriers to offer one-stop shopping services by putting the political weight of the Consultative Committee for International Telephony and Telegraphy behind the concept.

Currently, no CCITT recommendation addresses the subject of one-stop shopping, in which a carrier acts as a user's agent in obtaining, servicing and paying for private lines leased from foreign carriers.

Observers say many carriers are reluctant to invest the resources and give up the customer contact needed to provide one-stop shopping services until the CCITT establishes a recommendation.

"It gives guidance to those carriers that have never chosen to do this before," said Earl Barbely, director of telecommunications and information standards at the State Department's Bureau of International Communications and Information Policy.

Barbely will lead a U.S. delega-

(continued on page 36)

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CCITT to endorse one-stop shopping

continued from page 35

tion at a meeting of CCITT Study Group III in late August and early September. At this meeting, Study Group III will, among other things, vote on whether to accept the proposed one-stop shopping recommendation for consideration under the CCITT's accelerated approval process.

The recommendation is titled "Concept and Implementation of 'One-Stop Shopping' (OSS) For International Private Leased Telecommunication Circuits" (see graphic, page 35).

If, as expected, the recommendation is unanimously accepted for consideration under the accelerated approval process, member countries will have 90 days in which to accept or reject the proposal by mail. Approval by at least two-thirds of the returned ballots is required in order for the recommendation to be formally accepted by the CCITT.

But since no recommendation has ever been turned down once it has made it to ballot, this latter process is not expected to hinder final acceptance.

Thus, the Study Group III vote later this summer will be a watershed vote on the proposed one-stop shopping recommendation. And observers are optimistic that Study Group III will unanimously approve the recommendation, even though the U.S. has proposed some modest, last-minute wording modifications.

"I have no doubt that it will fly at the September meeting, which would put it into effect sometime in December," said Phillip Onstad, manager of international public policy for the International Communications Association (ICA). The ICA and the International Telecommunications Users Group (INTUG) both support CCITT proposals to establish a one-stop shopping recommendation.

Reluctant carriers

Users have clamored for one-stop shopping to eliminate many of the serious headaches surrounding international private networks. Unlike domestic networks, users need to deal with a minimum of two long-haul carriers — a domestic and foreign service provider — in order to lease, provision and correct faults on an international private line.

In recent years, major carriers have become more active in trying to meet this demand. For example, in late January, MCI Communications Corp. announced a new multilateral one-stop shopping program with 17 foreign carriers ("MCI to act as go-between for users building int'l nets," *NW*, Feb. 4). This spring, AT&T announced detailed one-stop shopping agreements with British Telecommunications PLC, France Telecom and Kokusai Denshin Denwa, Ltd. of Japan.

But observers say many small foreign carriers are reluctant to get involved in one-stop shopping agreements similar to those forged by AT&T and MCI. This poses a problem because one-stop shopping services from smaller carriers would probably be more valuable to users than one-stop shopping services from large carriers in major countries.

"I don't think most companies need one-stop shopping to the U.S., U.K. and Japan because they are probably well established there," said Peter Allen, INTUG's vice-chairman for regulatory affairs. "[Instead] most companies want one-stop shopping to the little countries where they don't have much presence."

Allen, Barbely and Onstad said approval of the CCITT recommendation would increase acceptance of one-stop shopping because many foreign carriers base their international services on CCITT recommendations.

Competitive bidding

But approval of the one-stop shopping recommendation could do more than encourage additional foreign carriers to support one-stop shopping.

Some observers said it could greatly increase international competition. This is because the recommendation would make it easier for users to have multiple foreign carriers bid to install and manage an entire global private network, Onstad said. A carrier could compete for the contract, even if none of a user's circuits are routed through the carrier's territory.

Currently, most foreign carrier competition is confined to persuading users to move private network hubs to another country.

"I think this is quite a good proposal that should encourage PTTs to work together to satisfy the needs of international business users," Allen said.

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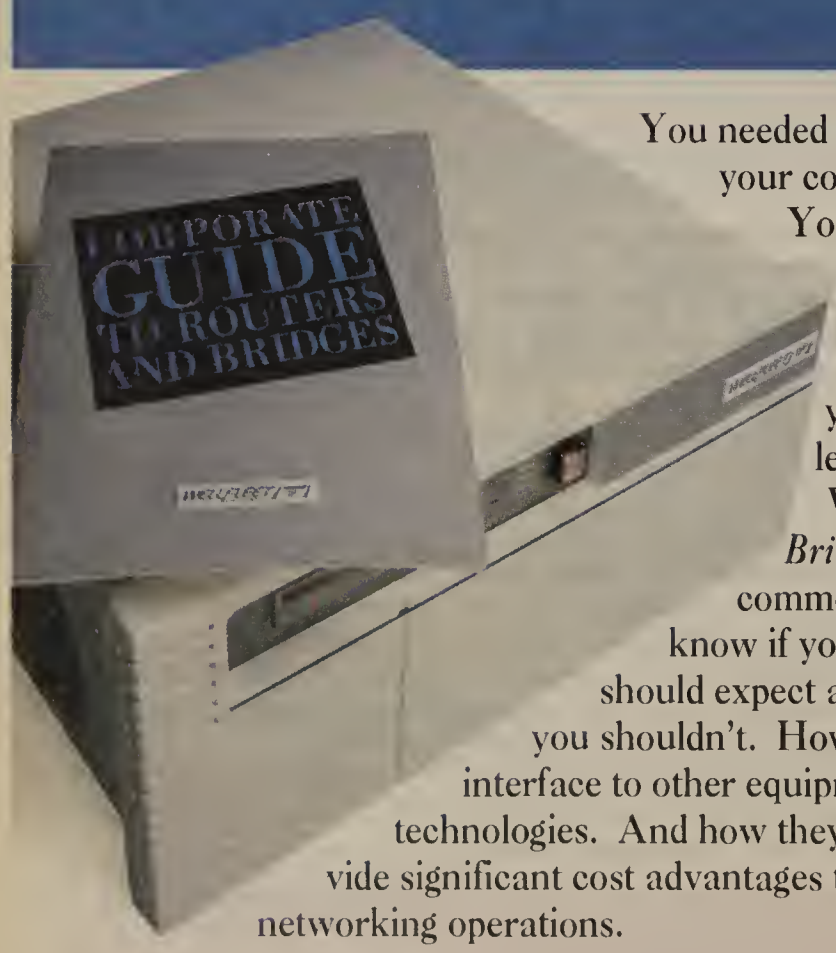

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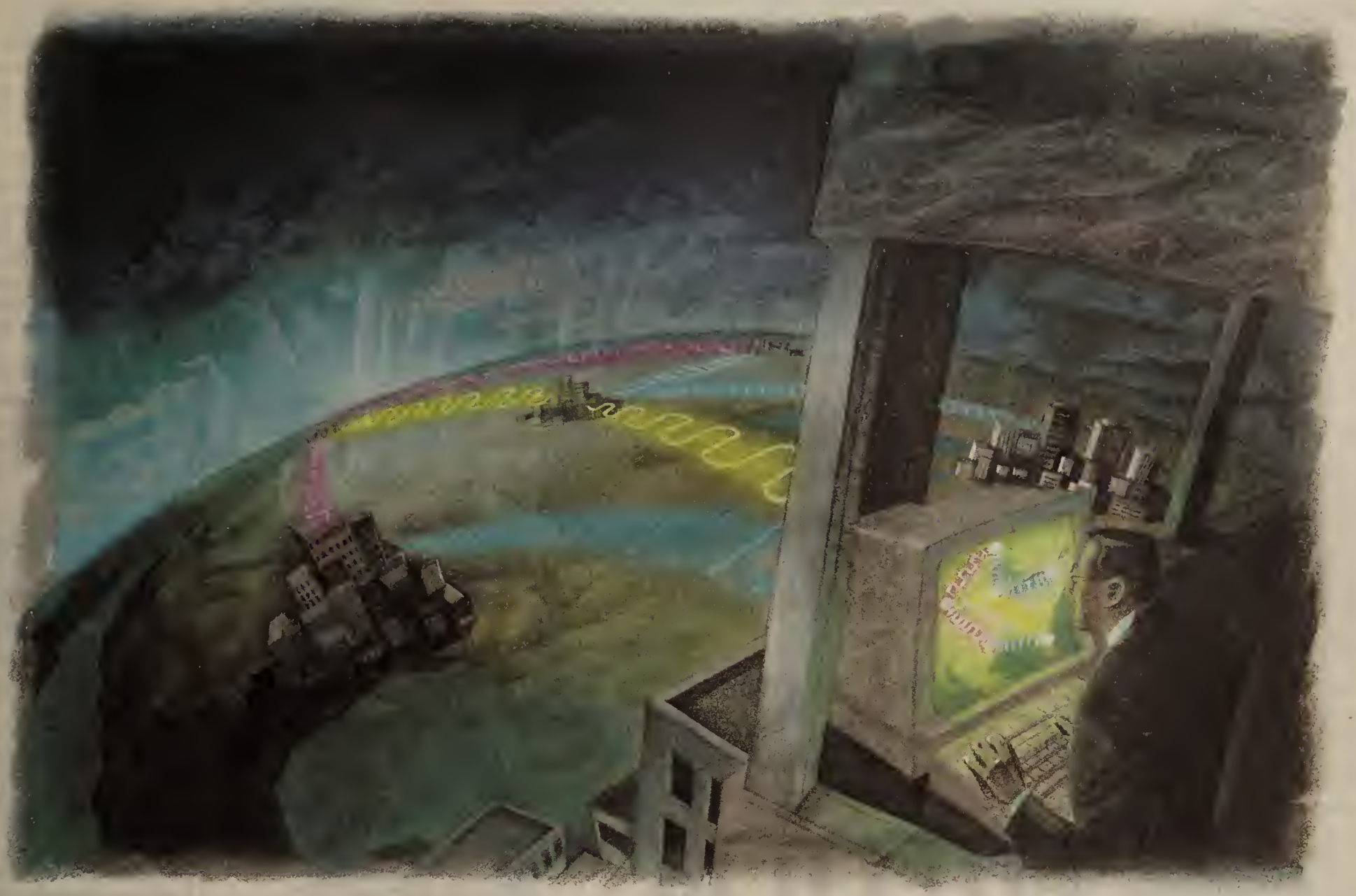
Users get switched access to SprintNet

continued from page 35

ing to a US Sprint spokeswoman. She added that the $500 fee would be applied to the cost of installing the dedicated access facilities.

"With the pace of today's world markets, the extra weeks of global connectivity and X.25 data communications capabilities provided through Fast Start can improve an organization's competitive posture," said Paolo Guidi, president of Sprint International, in a press release.

Sprint International also announced it has established 14.4K bit/sec access to SprintNet for customers with dedicated access in France, Japan, the Netherlands, Switzerland and the U.K. Previously, access speed was limited to 9.6K bit/sec.



Imagine the convenience of end-to-end network control at your fingertips.

Imagine the convenience and savings of highly-automated, end-to-end management and control under the umbrella of the COMSPHERE™ 6800 Series Network Management System (NMS). Picture your increased uptime and reduced costs with powerful automated functions—like alert-driven routines, automatic trouble-ticketing, automated trouble reporting—and optional interoperability with AT&T's ACCUMASTER® Integrator.

Offering the best of both worlds—the quality and reliability of AT&T with leading-edge technology from AT&T Paradyne—the COMSPHERE 6800 Series NMS offers support for today's wide area networks while continuing to support our heritage product offerings. It meets your changing needs through a modular hardware design—and a software licensing program that lets you introduce network management today at an attractive price, then add capacity as you need it.

Finally, imagine your peace of mind knowing your system is monitored 24 hours a day by NetCare® Support Services—bringing you a total solution for your continued business success. If this piques your imagination, call your AT&T Paradyne Account Executive or 1 800 482-3333, Ext. 310. In Canada, call 1 416 494-0453. Or, fax your request to 1 800 530-2103.

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Circle Reader Service #116

Ban lacks enforcement

continued from page 35

Teleglobe Canada, Inc., Telesat Canada and Unitel Communications, Inc. — must modify their tariffs by July 26 to prohibit bypass via the U.S.

Canadian regulators freely admit the new rule cannot prevent all U.S. bypass. They concede that the only real solution is for Canadian carriers to reduce their calling rates to the point where they are on par with or below U.S. carrier rates in order to eliminate the motivation for bypass.

"I think it's clear that rates should come down," said Don Bowles, a CRTC senior tariff analyst here.

"You can't put up these walls," he said. "There's no effective way of stopping it."

But Bowles said the CRTC has no immediate plans for forcing Canadian carriers to reduce rates to levels equivalent with U.S. carrier rates.

He argued that the CRTC needs to act now in order to keep U.S. bypass from growing to unmanageable proportions.

Canadian regulators are becoming increasingly concerned that U.S. carriers are planning to enter the Canadian bypass market in major proportions, Bowles said.

Competition from AT&T

AT&T, for example, recently filed a new tariff that enables users in Canada to route traffic across the border via private lines into an AT&T point of presence, Bowles said. Traffic would then be sent out over the public net for termination, with users billed at AT&T's Megacom WATS service rates.

Megacom WATS traffic could be easily rerouted to Canada or overseas, according to Bowles. This would enable users to complete long-distance calls across Canada or overseas at AT&T Megacom rates that are much cheaper than long-haul Canadian tariffs.

Bowles said the CRTC filed petitions with the Federal Communications Commission protesting the AT&T service, but "AT&T basically said, screw you — we'll go ahead anyway."

According to Bowles, carriers including US Sprint Communications Co. have set up Canadian subsidiaries that are focusing on generating more bypass traffic.

"If they were interested in grasping huge amounts of market, they could certainly do so," he said.

Bowles complained that U.S. carriers are carrying bypass traffic even though they have agreements with Canadian carriers that are supposed to prevent them from doing so. For this reason, the CRTC decided it was necessary to modify tariffs so users, as well as carriers, would be prevented from engaging in U.S. bypass.

Currently, the only Canadian carrier with tariffs that prevent users from routing bypass traffic through the U.S. is Bell Canada, Bowles said.

Law-abiding citizens

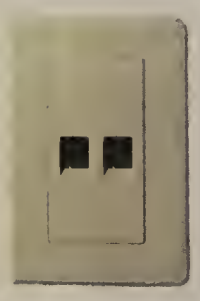
Even though users will be able to circumvent the ruling, most will probably obey the law out of a sense of civic duty, according to Bryan Turner, president of the Canadian Business Telecommunications Alliance, a major user group.

As a result, Turner said many users that have engaged in U.S. bypass will probably see their network bills increase.

The new rule also could have a big impact on resellers, which are the only carriers currently able to compete with Canada's monopoly regional carriers in the provision of public switched voice services. Resale competition was only allowed last year.

Angus estimated that Canada's 35 resellers pulled in revenues of about $100 million in 1990 — about half of that coming from service to the U.S. She added that many resellers were routing traffic via the U.S. for termination overseas or back in Canada.

But Angus said the new rule will probably prevent resellers from publicly marketing U.S. bypass services, even though they could engage in clandestine bypass.

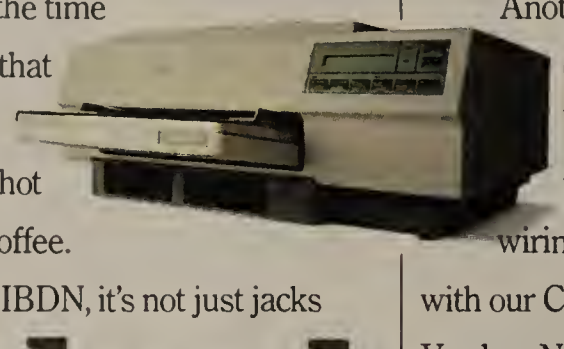


We're talking standard, everyday jacks here.

What makes these everyday jacks so nimble and quick is the wiring system. Integrated Building Distribution Network (IBDN) from Northern Telecom.

That's because IBDN uses unshielded twisted pair wire, along with fiber optic cable, which offers many advantages over the very unnimble and expensive shielded cable.

Phones plug right in. So do computers, video equipment, and just about anything you can imagine. That's pretty nimble.



do it in the time it takes that person to get a hot cup of coffee.

With IBDN, it's not just jacks that are so versatile either. You'll find Local Area Networks fit into the system beautifully. And our open architecture, which adheres to all major standards including ISDN, 10 Mbps Ethernet, 16 Mbps Token Ring and 100 Mbps FDDI, lets us tailor a network to meet the needs your business faces today.

And lets you jump into the future with confidence.

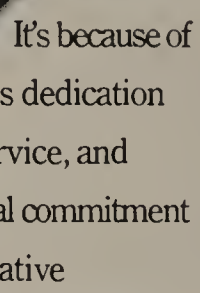
Jacks be nimble, jacks be quick.

Another thing that we're very quick on is support. When you turn to us for an end-to-end wiring system, we'll back it up with our Certified System Vendors Network.

It's because of this dedication to service, and our total commitment to innovative technology, that we're able to offer

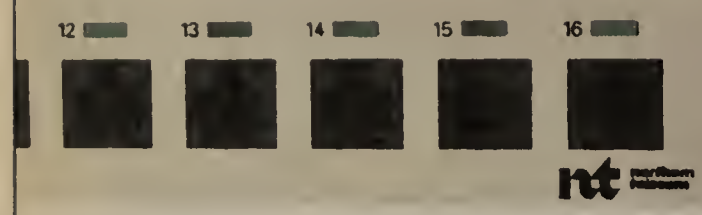
you the most important thing of all. Peace of mind.

So if you're looking for solutions to your wiring system, talk to one of our Northern Telecom sales representatives or call our Outside Plant Division today at 1-800-NORTHERN. After checking out IBDN, you'll agree that no one can hold a candle to us.



And quick?

Well, let's just say, if you were moving someone's computer from one office to another, you could



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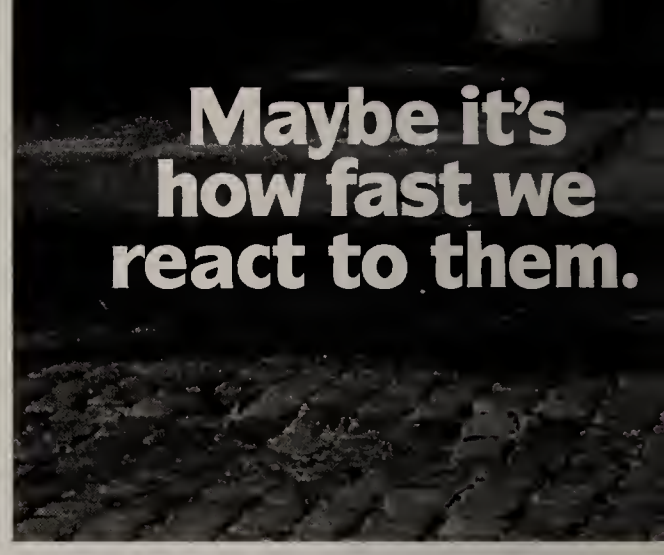
northern telecom

TECHNOLOGY THE WORLD CALLS ON.™

Circle Reader Service #136

There must be a reason why a company grows by 100% in just 4 years.

There must be a reason why MCI's 800 Service grew from 0 customers four years ago, to more than 100,000 today.



Customers seem to like how quickly we respond, as much as they like the quality of the response. And the fact that before we do anything, we listen. Listen to what the problems are.

MCI® has one of the world's most modern telecommunications networks, but the big reason we grew so far, so fast, is how we put it to work. For each customer.

MCI 800 Service℠ is always tailored to your company, not simply sold off the shelf or in packages that don't fit your needs.

Those needs can range from customer service to sales and marketing to internal communications. MCI 800 Services can be tailored to route calls to the right people and places, quickly. Either automatically, or by menu.

Peak loads can be planned for, overflow calls can be shifted automatically to other locations.

Calls can be managed by time of day, geography, product lines, zip codes, etc.

Your customers get their problems solved and your employees get the information they need quickly and easily. And changes in service can be quickly made on line—on your own or with MCI help.

We can help with fast installation when you need it as well. This can mean having MCI 800 service up in under 24 hours.

And if things go wrong—power failures, personnel shortages—emergency plans can be standing by. We know how critical your 800 service is to your business.

If you have international customers (or would like to), MCI can make your connections with 28 countries, and more are on the way. Toll-free calling can attract new customers, keep suppliers plugged in, and traveling employees in contact.

MCI 800 Service

24-hour installation for last minute needs.
Emergency backup and on-line control available.
Flexible call routing by time, geography, menu, department, zip code.
Significant cost saving/controls, along with unsurpassed quality.
International, national, regional, local.

© MCI Telecommunications Corporation 1991

Beyond fast service from MCI, you can also look for comprehensive management reporting. Information that helps you control costs, build lead lists, track responses, and more.

MCI's spectacular growth has been based on delivering the value, the products, and the responsive people of MCI. And the quality and reliability of the entire worldwide MCI network. No wonder more than 100,000 companies have signed up with MCI 800 Service.

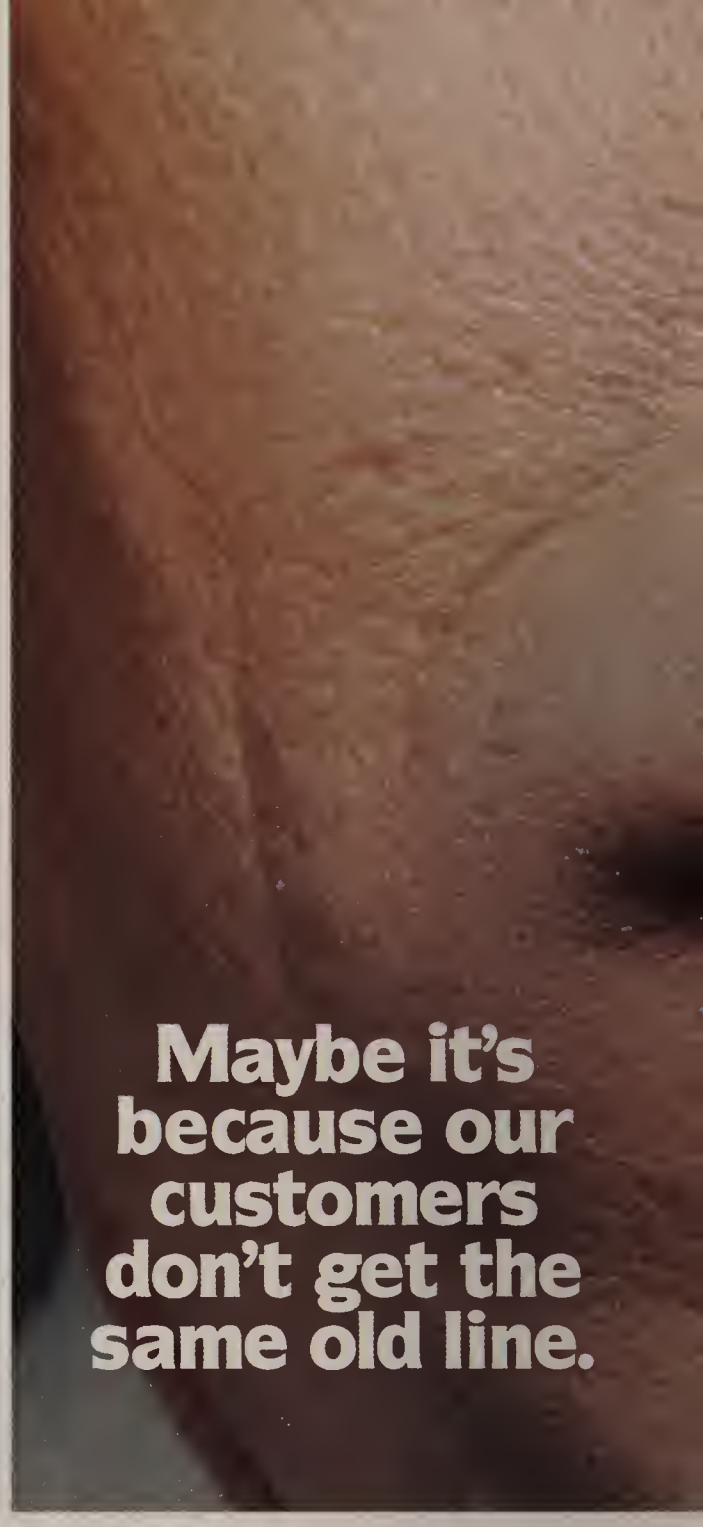
Call us and find out how fast we can move for you. Call 1-800-888-0800.

MCI®
800 Service

There must be a reason why MCI's Vnet business is 3 times bigger than it was 2 years ago.

Instead of "take-it-or-leave-it," instead of "that's the way we do it," there's another way of treating customers. The MCI® way. A real alternative. Including MCI's Vnet,® where we can show you the advantages of virtual networking. In short, the benefits of a private network without the cost of a private network.

In just a short time, MCI has built the capability to handle whatever you come up with. Voice, data, video and fax. Vnet is provided over MCI's predominantly digital network, with a robust advanced signaling system, along with the superior network intelligence and control you're looking for.

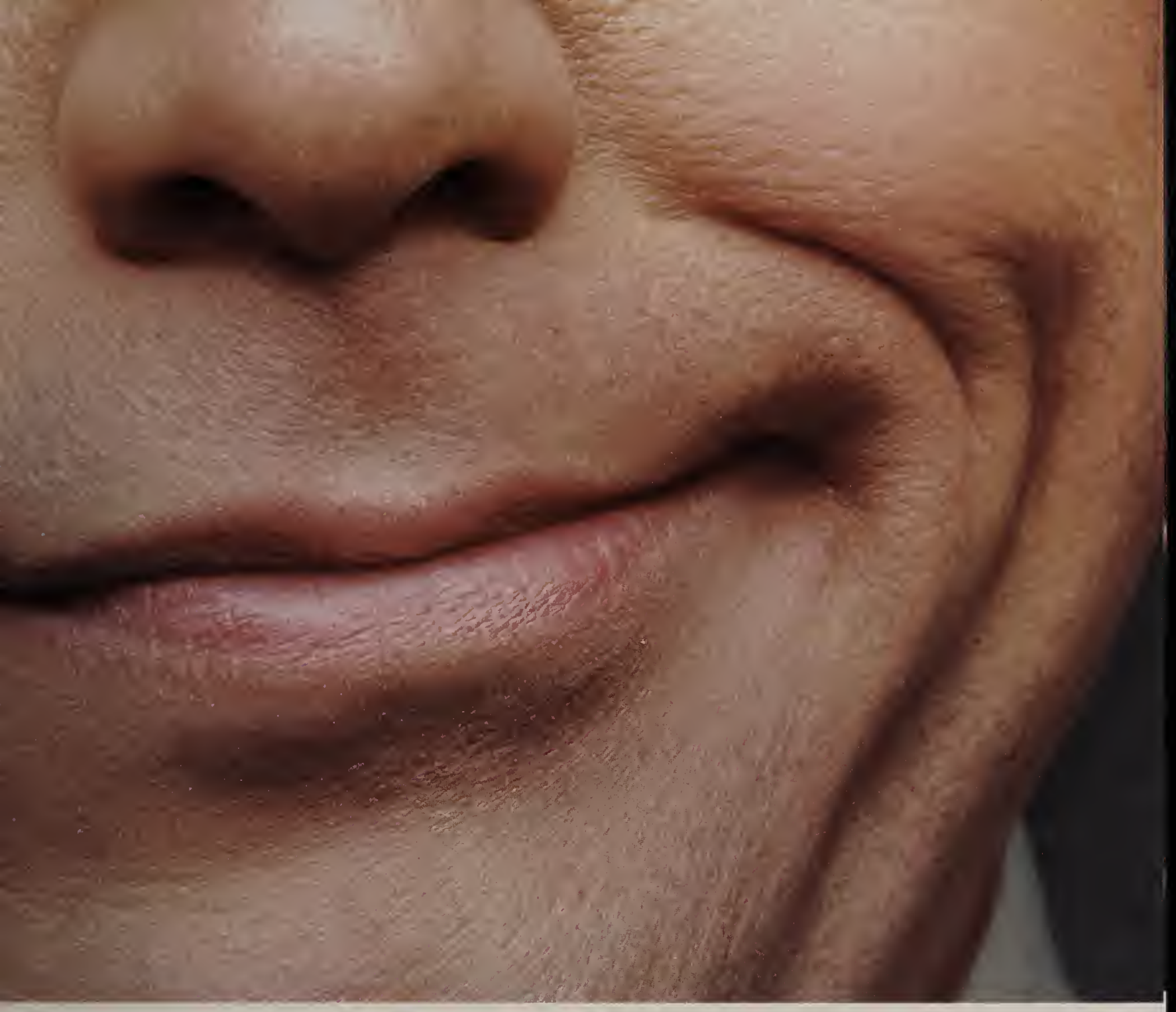


It's state-of-the-art, and building. And that goes from building to building, continent to continent, end to end.

So, we have what you need, and we'll work with you to put together a network that fits those needs. Like: flexible dialing plans, customized routing and screening, on-line database management, switched data services, traveling employee access and network management.

In short, we have the features you want, and we can deliver them in short order.

And right on the money.



In fact, we've got an invoicing and reporting system that's the best in the industry. With the accuracy, flexibility, not to mention the timeliness,

MCI Vnet Service

MCI Vnet is a predominantly digital international network.
Superior network intelligence, with robust advanced signaling.
Full capability, efficiency and flexibility.
On-line database management.
Superior invoicing and customized call reporting.

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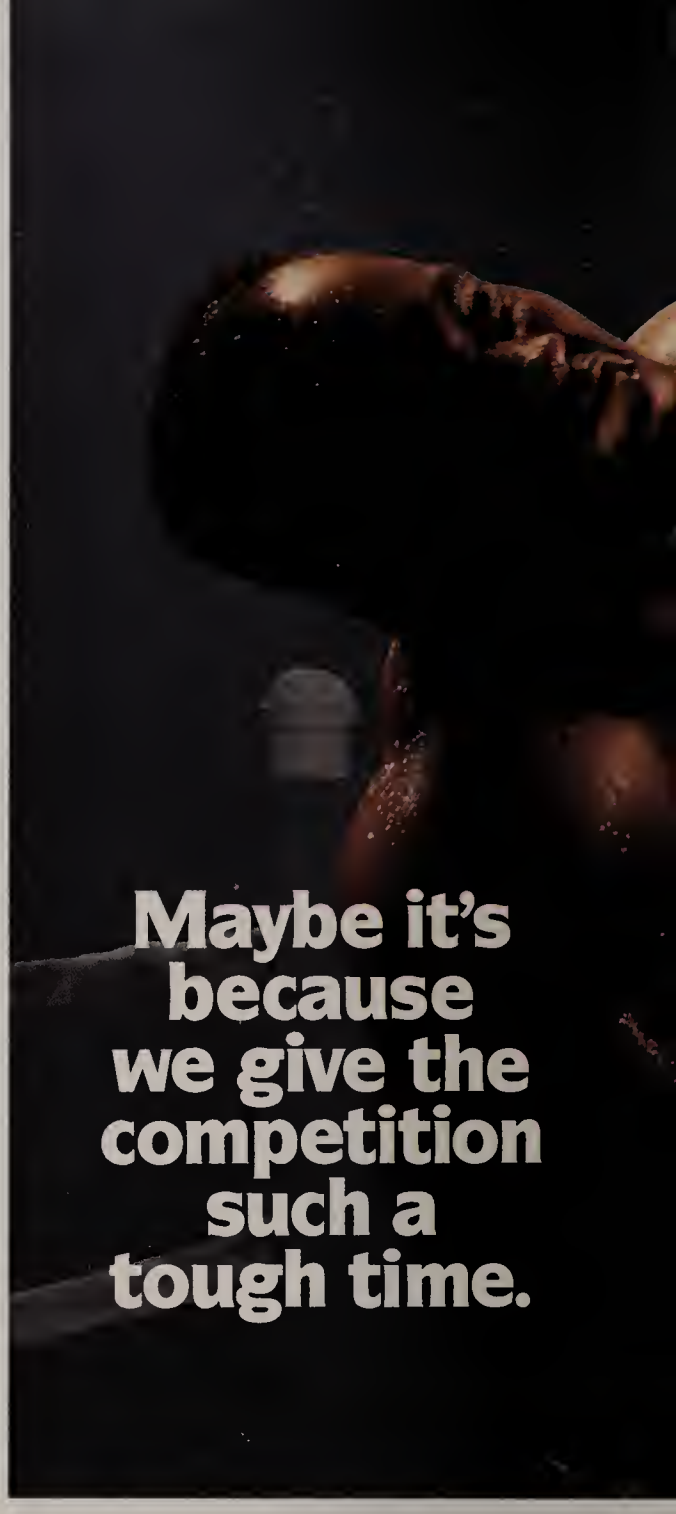
you need. Plus you're able to choose exactly where the information goes.

From minute detail to executive summary, everyone can get just the information they need to get a handle on costs.

All this on top of the fundamental quality, reliability and value of the MCI network itself. All brought home to you by the very responsive sales, support and service people who simply won't give you the same old line.

No wonder MCI's Vnet has made virtually hundreds of virtual network customers very satisfied. Why not join them? Call 1-800-888-0800.

MCI® Vnet



There must be a reason why MCI's data customers have tripled their business with us since 1986.

First MCI® shook up the industry in voice, and now—data. Along with an attitude that sets us apart from the other guys: we're easy on our customers, but mean to our competitors.

We're beating them to the punch by delivering high-speed Switched T-1 and Switched T-3 bandwidth on demand, whenever you need it.

But that's just the latest example of us working with our customers to develop flexible, high-speed, cost-effective communication services.

In fact, every day we handle everything from disaster recovery to time-sensitive fund transfers, to interconnecting LANs. All the while pushing for higher quality and lower costs. Like developing switched high quality video conferencing that's so affordable, it's actually useable.

We're also the first to install SONET—for even higher bandwidth and higher speeds. Operating at 2.4 gigabits per second, and carrying 32,000 simultaneous two-way data circuits on one fiber pair, MCI again is leading the way to new transmission pathways for data, voice and imaging applications.

Another MCI innovation is our Digital Reconfiguration Service,℠ so you can easily reconfigure your network or even add capacity, quickly and easily as traffic demands change.

No matter what, MCI people work with you

to put together the right technology, services, and creative solutions to meet specific applications.

And so that you're not trapped by techno-

MCI Data Service

High speed, high quality, high tech.
Switched 56, Switched T-1 and Switched T-3.
SONET multi-gbps/32,000 simultaneous 2-way channels.
Full capability and flexibility—worldwide.

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logy or investments, these solutions can be adapted and modified as needs and times change, adding to their efficiency and value.

And this extends around the world. Because the MCI data network extends internationally to connect the U.S. to more than 250 countries. So you can make use of MCI's data network quality and reliability—worldwide.

And to continue to give the competition a hard time, we're keeping the pressure on them (and ourselves) to come up with more innovations.

Keep your left up, guys. Give us a call. 1-800-888-0800.

MCI®
Data Services

There must be a reason why MCI® has grown so much. Maybe it's our more than one million business customers.

They discovered "the right choice" wasn't the only choice. Much less the best choice.

They called MCI.

For Data, Vnet and 800 Services. And more.

They found MCI had the products and services they needed.

They also found MCI people ready, willing and able to help meet their unique telecommunications challenges.

With answers that weren't off the shelf or off the cuff.

For more reasons why MCI could be the answer for your company, maybe you should call 1-800-888-0800.

MCI®

"The right choice" is a service mark of American Telephone and Telegraph Company.

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Shiva announces four-port Hublet Ethernet repeater

Shiva Corp. last week announced **Hublet,** a standalone, four-port repeater for Ethernets supporting unshielded twisted-pair wiring. Each Hublet can connect as many as four devices to a single 10BaseT outlet, reducing the need to run additional wiring leads from a main hub.

Hublet complies with the IEEE 802.3 10BaseT standard and works in any network that supports the Link Test function as well as Shiva's EtherPort cards.

Shiva's Hublet will ship at the end of this month and cost $399.

Shiva Corp., 1 Cambridge Center, Cambridge, Mass. 02142; (800) 458-3500.

Sophco unveils OffSite remote access pack

Sophco, Inc. recently announced **OffSite,** a communications package that enables a user to communicate with, manage and diagnose faults on a remote computer via a modem.

OffSite consists of a Commander module that resides on a central personal computer and Receiver modules that are installed on remote computers. The software enables a central user to issue over 40 commands, including SEND and GET files, view configurations and scan applications.

OffSite lets a central user share a remote user's keyboard, screen and printer, as well as run tests, copy files, and execute programs remotely, thereby eliminating field trips to troubleshoot problems.

OffSite costs $295 for a single Commander module, while each Receiver module costs $95. It is available now.

Sophco, Inc., P.O. Box 7430, Boulder, Colo. 80306; (303) 444-1542.

RAD Data serves up T-1-to-E-1 converter

RAD Data Communications recently announced the **SPD-T1/802,** a T-1-to-European T-1 converter that enables U.S.-made T-1 equip-

(continued on page 40)

Mgmt. agent widens reach of EtherNext

By Caryn Gillooly
Senior Editor

IRVING, Texas — Networth Corp. recently added a net management agent to its EtherNext Series 4000 wiring hubs that enables administrators to monitor and control TCP/IP internetworks as well as Novell, Inc. Internetwork Packet Exchange (IPX) local-area networks.

The software agent consists of Transmission Control Protocol/Internet Protocol and IPX protocol stacks, which support the Simple Network Management Protocol (SNMP) and Novell's NetWare Diagnostic Protocol (NDP), respectively.

The TCP/IP stack enables the agent to forward alert data from TCP/IP internetworks to Networth's EtherManager Network Management Software via SNMP, while the IPX stack sends net control data from NetWare LANs to the net management software via NDP.

Previously, the agent could only relay NetWare-specific management information.

NDP is the NetWare monitoring protocol, similar to SNMP, included in the IPX protocol stack that enables an administrator to monitor NetWare devices through various management packages. Currently, some third-party vendors, such as Cheyenne Software, Inc. and Frye Computer Systems, Inc., support the NDP protocol in their management products.

The primary advantage of the dual support, according to Networth President John McHale, is to go beyond the current bounds of network management. With support of both protocol stacks, the LAN administrator can access management information about the internetwork through SNMP and the enterprisewide administrator can obtain similar information about the LAN through NDP.

(continued on page 41)

Software lets Mac monitor multiple AppleTalk routers

LAFAYETTE, Calif. — Neon Software, Inc. recently introduced a management product that enables users to monitor multiple AppleTalk routers across an internetwork environment from a single Apple Computer, Inc. Macintosh.

The company's RouterCheck software allows an administrator to glean and maintain information on router locations and configurations. It also aids in optimizing performance through a set of monitoring and graphing capabilities.

RouterCheck joins two other Neon Software management products, NetMinder Ethernet and NetMinder LocalTalk, both of which are packet-level network analysis tools.

RouterCheck can compile a list of multivendor AppleTalk routers installed across a local-area network internet. The administrator can obtain information on the net segment to which the router is attached, the router node, zone, type and name, as well as data on routing tables and network services supported.

For some routers, the administrator can obtain serial number, model number and software version data.

The product also performs zone verification and consistency checking — in effect, examining whether each router accurately understands the zone it is serving and the zone location of all other routers on the network. The software can be used to pinpoint configuration problems and then recommend ways to resolve those problems.

In addition, RouterCheck can be used to display statistics such as packets received and transmit counts, as well as error and collision counts from some widely used routers, including Cayman Systems, Inc.'s GatorBox, Compatible Systems' Ether*Route and Shiva Corp.'s FastPath.

By graphically displaying statistics, administrators can track router activity and reconfigure the network for optimum performance.

RouterCheck runs on any Macintosh under System 6.0 and is compatible with System 7.0. It supports LocalTalk, EtherTalk and TokenTalk networks, including Phase 1, Phase 2 and mixed-phase environments.

The product will be demonstrated at Mactivity '91, July 23-25, at the Santa Clara Convention Center in Santa Clara, Calif. RouterCheck is priced at $649 and is expected to ship next month.

For more information, contact Neon Software at 1009 Oak Hill Road, Suite 203, Lafayette, Calif. 94549; (415) 283-9771.

DG extends MV line, adds net packages

Communications offerings include first-time support for Apple Macintoshes, enhanced TCP/IP software.

WESTBOROUGH, Mass. — Data General Corp. last week introduced three new models of its 32-bit Eclipse MV minicomputer and two communications products designed to enhance the ability of MV systems to function as servers in multivendor networks.

The new communications products include a software package that enables MVs to support Apple Computer, Inc. Macintosh microcomputers for the first time and an enhanced Transmission Control Protocol/Internet Protocol offering that adds support for token ring, X.25 and the Simple Network Management Protocol (SNMP).

The new MV minicomputers, which can be configured as network servers, include the MV/5600 DC, the MV/9300 and the MV/9600. The machines are based on a new version of DG's very large-scale integration CMOS microprocessor that is said to provide as much as 40% more horsepower than earlier counterparts for roughly the same price.

The MV/5600 DC becomes the most powerful system at the low end of the MV family. It can process seven million instructions per second (MIPS), offers an integrated Ethernet port, dual Small Computer System Interface ports, six I/O controller slots, support for up to 128M bytes of memory and 13G bytes of hard disk storage. Prices for the deskside system start at $55,000.

The MV/9300 is a rack-mountable machine that can process three MIPS and support up to 128M bytes of memory and 77G bytes of mass storage. Prices for the computer start at $35,000. Board-level upgrades for earlier machines are available starting at $22,000. Both the MV/9300 and the MV/5600 DC are available within 30 days of receipt of order.

The MV/9600, which is available now at prices starting at $72,000, can process seven MIPS and support the same amount of memory and disk storage as the the MV/9300.

All three machines and the other models in the MV product line can support the two new communications products, OpenMAC for MV/Systems and AOS/VS II TCP/IP 1.10.

OpenMAC, the first Macintosh connectivity product sold and supported by DG, enables MV systems to support Macintosh microcomputers as MV terminals and to provide Macintosh print and file

(continued on page 40)

Tool extends developers' 3270 reach

WEST CHESTER, Pa. — Dabiwa, Ltd. last week announced Clip2, a tool that enables software developers to embed IBM 3270-type functions in personal computer applications.

Clip2 lets users develop applications that establish 3270 terminal-emulation sessions on demand to access data from or update host data bases.

The software can also be used to create intricate application scripts that enable a personal computer to automatically log on to a host and initiate a program, such as a data transfer, without operator intervention.

Clip2 is a software library of more than 80 connectivity functions that support IBM's High Level Language Applications Programming Interface (HLLAPI) and can be linked via Clipper or C source code to produce executable applications, according to Bill Harris, president and chief operating officer at Dabiwa.

On the software development side, Clip2 enables developers to write applications that capture specific fields of data from host screens, transfer data to a personal computer application for editing and send the modified file back to the host.

It also allows personal computer users to send host commands. Instead of writing their own 3270 access routines, developers can plug in any of the 80-plus functions in Clip2.

Applications written with Clip2 allow end users to conduct data transfers without MIS intervention on the host side, Harris said.

A personal computer application, for instance, could automatically handle nightly upload or download tasks.

The software also allows de-

(continued on page 41)

First Looks

continued from page 39

ment to operate over E-1 transmission facilities abroad.

The device, which is slighty larger than a personal computer modem, provides interfaces to an E-1 line and a T-1 equipment port on a private branch exchange, multiplexer or other device.

The SPD-T1/802 is available now and costs $2,700.

RAD Data Communtcattons, 151 West Passaic St., Rochelle Park, N.J. 07662; (201) 587-8822.

Simpact offers souped up CNS 6200 wide-area network server

Simpact Associates, Inc. recently announced an enhanced version of its CNS 6000 series communications server that provides a more powerful central processor and expanded memory support.

Simpact's **CNS 6200** is based on a Motorola, Inc. 68020 microprocessor and comes with 8M bytes of memory, in contrast with the company's older CNS 6000 that was based on a 68010 and offered only 2M bytes of memory.

The new model will provide users with improved processing power for supporting wide-area network protocols, a company spokesman said. Like its predecessor, the CNS 6200 provides centralized wide-area communications services to workstations on a local-area network.

Pricing for the CNS 6000 servers, which are available now, starts at $7,950.

Simpact Asscoiates, Inc., 9210 Sky Park Court, San Diego, Calif. 92123; (619) 565-1865.

Advanced Systems Concepts adds remote backup to Shadow software

Advanced Systems Concepts, Inc. recently announced that it added to its Shadow software a **Remote Shadow Option,** which enables users to automate the task of backing up data to different disks.

Running on Digital Equipment Corp. VAXes under VMS, the Remote Shadow Option enables users to back up local disks at a remote site. Every time a local file is stored to the primary disk, the software automatically ships a duplicate copy across a wide-area link to a remote disk.

Alternatively, system operators can use the software to dump the contents of a local disk to a remote disk at a specified time. Shadow software previously required the backup disk to be located at the same site as the primary disk.

The Remote Shadow Option includes an algorithm that compresses data before transmission across the wide-area circuit. The firm claims the algorithm can reduce a file content by 75%, thus keeping the bandwidth needed to support remote disk backup to a minimum.

Remote Shadow Option pricing ranges from $2,500 to $46,900, depending upon processor model.

Advanced Systems Concepts, Inc., 33-41 Newark St., Hoboken, N.J. 07030; (800) 229-2724.

Square D introduces UPS line for factory local-area networks

Square D Co.'s Power Protection Systems unit recently announced a new line of uninterruptible power supply created for computer-aided design and manufacturing systems, file servers and factory floor network devices.

The new **Topaz Micro II** provides protection against surges, high-voltage spikes, AC line noise, brownouts, power outages and circuit overloads. The Topaz Micro II line consists of five models ranging in power from 600VA/600Watt to 1300VA/1300Watt.

All models are compatible with Banyan Systems, Inc., Novell, Inc., 3Com Corp. and other popular local-area networks. Available now, the Topaz Micro II models range in price from $960 to $1,715.

Square D Co., 9192 Topaz Way, San Diego, Calif. 92123; (619) 279-0111.

DG extends MV line, adds net packages

continued from page 39

services. The software supports the Apple Data Access Language to facilitate data transfer between the systems.

OpenMac pricing depends on the components used. The basic transport facility costs $125 to $1,600, depending on the MV system. The file server facility costs $1,050 to $27,000, depending on the number of users. The print server facility costs $1,000 to $4,000, depending on the number of print queues needed, and the virtual terminal facility costs $1,400 to $37,500, depending on number of users.

The product is expected to be available in the fourther quarter.

The enhanced TCP/IP offering, AOS/VS TCP/IP 1.10, builds on the company's earlier product by adding support for IEEE 802.5 token-ring networks, IP routing over X.25 packet networks and an SNMP Management Information Base II agent.

It also comes with the capabilities of the previous version, which supported 802.3 Ethernets, the File Transfer Protocol, Simple Mail Transfer Protocol and Telnet.

The TCP/IP software license is priced the same as the earlier version at $1,100 to $14,900, depending on the system used. It is available now.

WITH OUR NEW SX MODELS, IBM MAXIMIZES THE POWER OF THE INTEL 486 CHIP. AGAIN.

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Tool extends developers' reach

continued from page 39

velopers to write friendly application interfaces that shield users from complex 3270-type screens, enabling them to key data into a series of fields. Data entered into those slots is then mapped into the correct 3270 format and sent to the host. Conversely, host-based data can be accessed by field type instead of downloading an entire file, which reduces demands on host processors. Host data is mapped for display on personal computer screens.

Clip2 applications can also be constructed so that if a host link goes down, data entry clerks can continue keying in data as if they are host-attached. The data is then buffered and when the host connection is reestablished, the software conducts a batch file upload to the host.

> Clip2 applications can also be constructed so that if a host link goes down, data entry clerks can continue keying in data.
>
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Jack Eason, a systems analyst at Santa Cruz County's information systems center in Santa Cruz, Calif., has beta-tested the product for the last three weeks and said it's proven to be a time saver.

"Programming in other languages allows you to make your own HLLAPI strings," Eason said. "But it sure is wonderful to sit there and invoke these Clipper strings of 3270 functions."

Eason and others at the Santa Cruz information center have developed an application that lets remote personal computer users using WordPerfect Corp.'s WordPerfect software send print jobs to the center's IBM mainframe, which then routes the tasks to any printer in a county office.

"It's nice because the user thinks he's still operating in WordPerfect, but in reality, he's set up a 3270 session to send the print job to the host," Eason said.

Another benefit to using Clip2, he added, is that it saves the county from retraining workers who are used to operating in WordPerfect, to use a 3270 screen format to send a print job to the host.

"We don't have to teach these people a whole new system on how to print; they use the same commands as when they're in WordPerfect," Eason said.

Clip2 uses from 2K bytes to 20K bytes of memory, although Harris said few applications would require more than 5K bytes. It works in tandem with popular 3270 terminal-emulation cards and emulators from such venders as Digital Communications Associates, Inc., IBM and Novell, Inc.

Clip2 3270 is available now. It costs $1,495 for a two-user version and $1,695 for a five-user version.

For further information, contact Dabiwa at 301 Joseph Drive, West Chester, Pa. 19380, or call (215) 692-8130.

Mgmt. agent widens reach of EtherNext

continued from page 39

"Usually, you've got your local network running NetWare and your wide-area network running TCP/IP, each with its own administrator," McHale said. "But the point here is that [the agent in] this hub can [relay information] about both."

McHale said the agent supports both the Management Information Base (MIB) I and MIB II specified within SNMP, in addition to a proprietary MIB. The MIB is a data base of information specified by the management protocol listing devices on the network, what they do and how they work. The management protocol, then, knows how to manage those devices accordingly.

McHale added that no other hub vendor supports NDP, and, therefore, no other hub vendor can provide management down to the port level on a NetWare LAN while providing internetwork management.

"When all workstations [on the network] are Unix-oriented," McHale said, "then SNMP is the right protocol for managing that environment. But there's an awful lot of NetWare systems out there and plenty of mixed environments."

Networth, based here, will continue with network management releases when it rolls out in October what it calls a "proxy agent," an agent that will let high-level managers using SNMP see through the eyes of NDP down into the NetWare LAN. This proxy agent, according to McHale, will let SNMP provide all the management capabilities offered under NDP.

The new agent will be available next month at no additional cost to current EtherNext Series 4000 users. The price for the EtherNext Series 4000 12-port chasis with smart host module is $2,995 and will not increase with the added SNMP support.

For more information, contact Networth at 8101 Ridgepoint Drive, Irving, Texas 75063, or call (214) 869-1331.

got a champion, the line.

33 MHz models, so challenging hurdles like multimedia are easily cleared. The 25 and 33 MHz models also include a math co-processor for improved performance in numeric-intensive applications like financial modeling and CAD/CAM.

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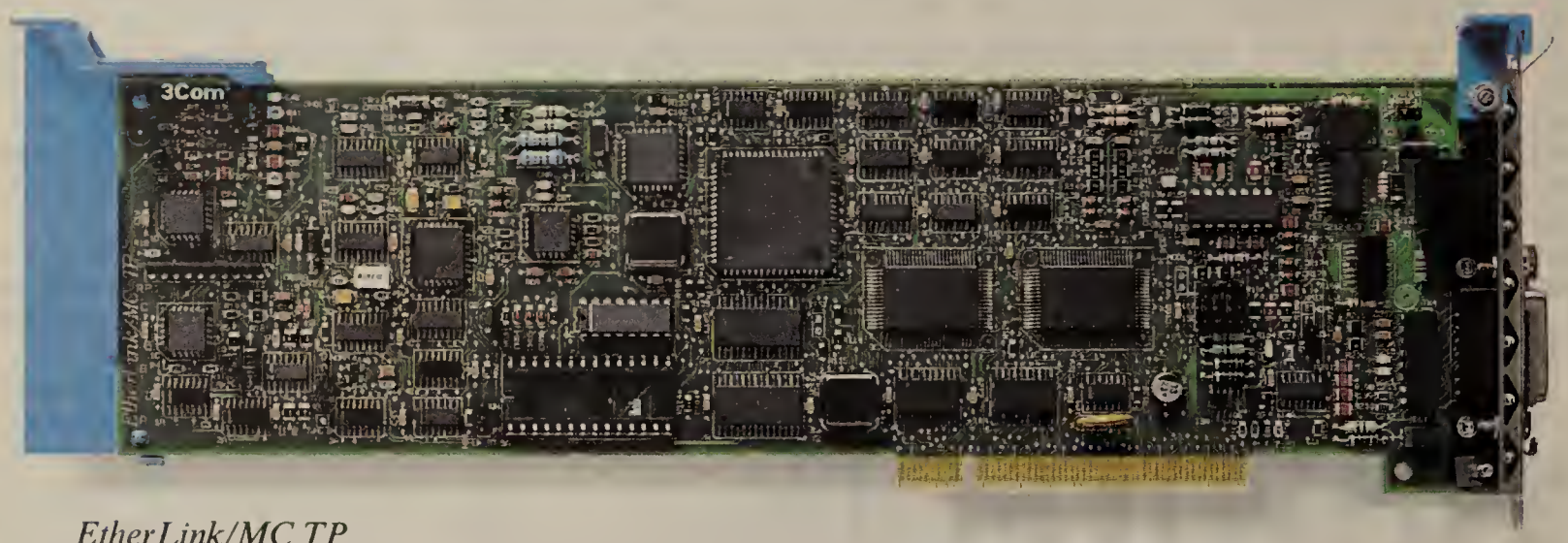
Every twisted question



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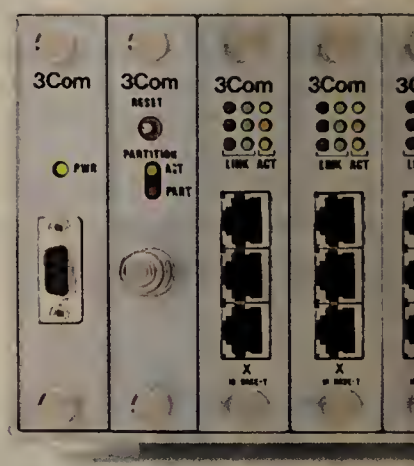

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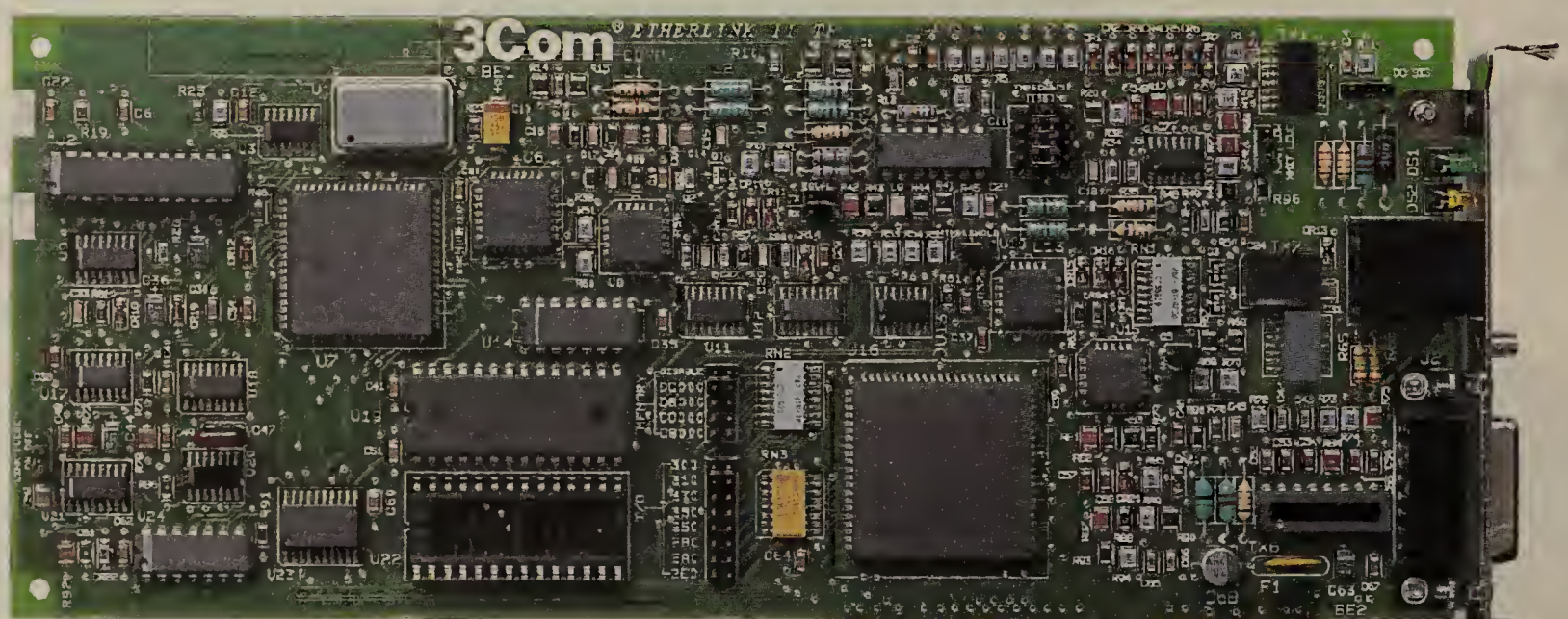

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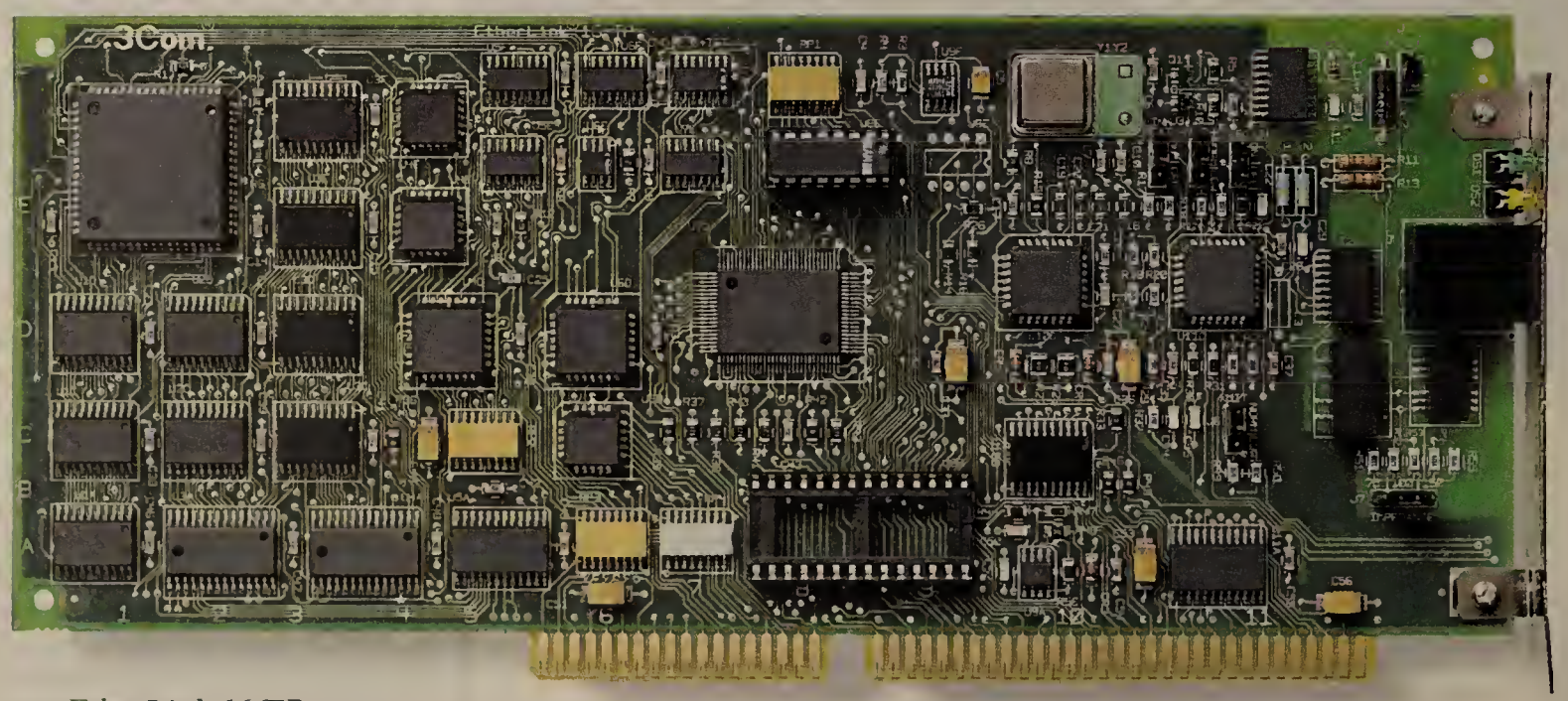

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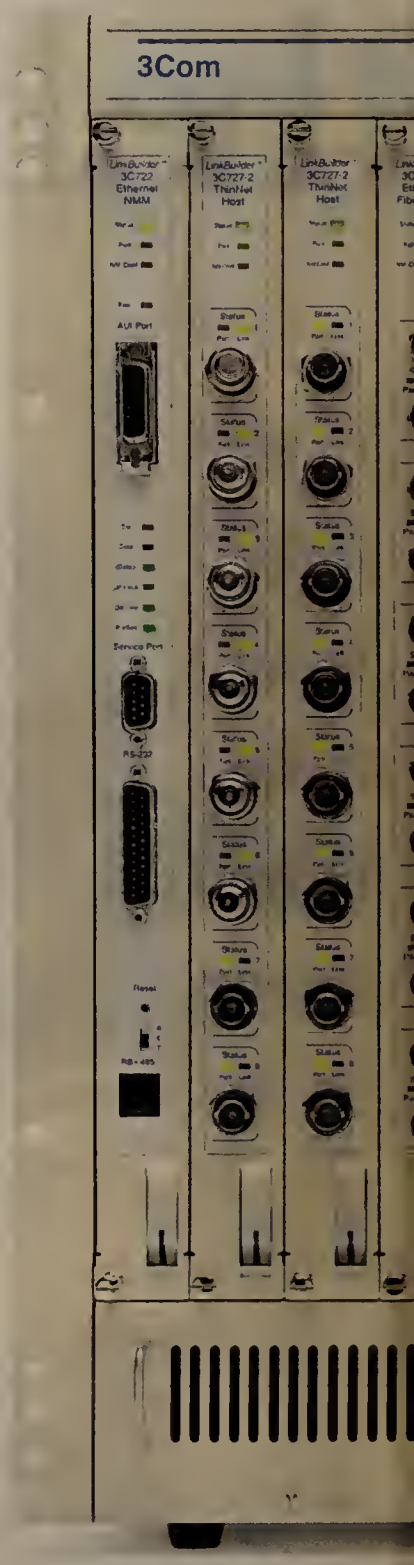

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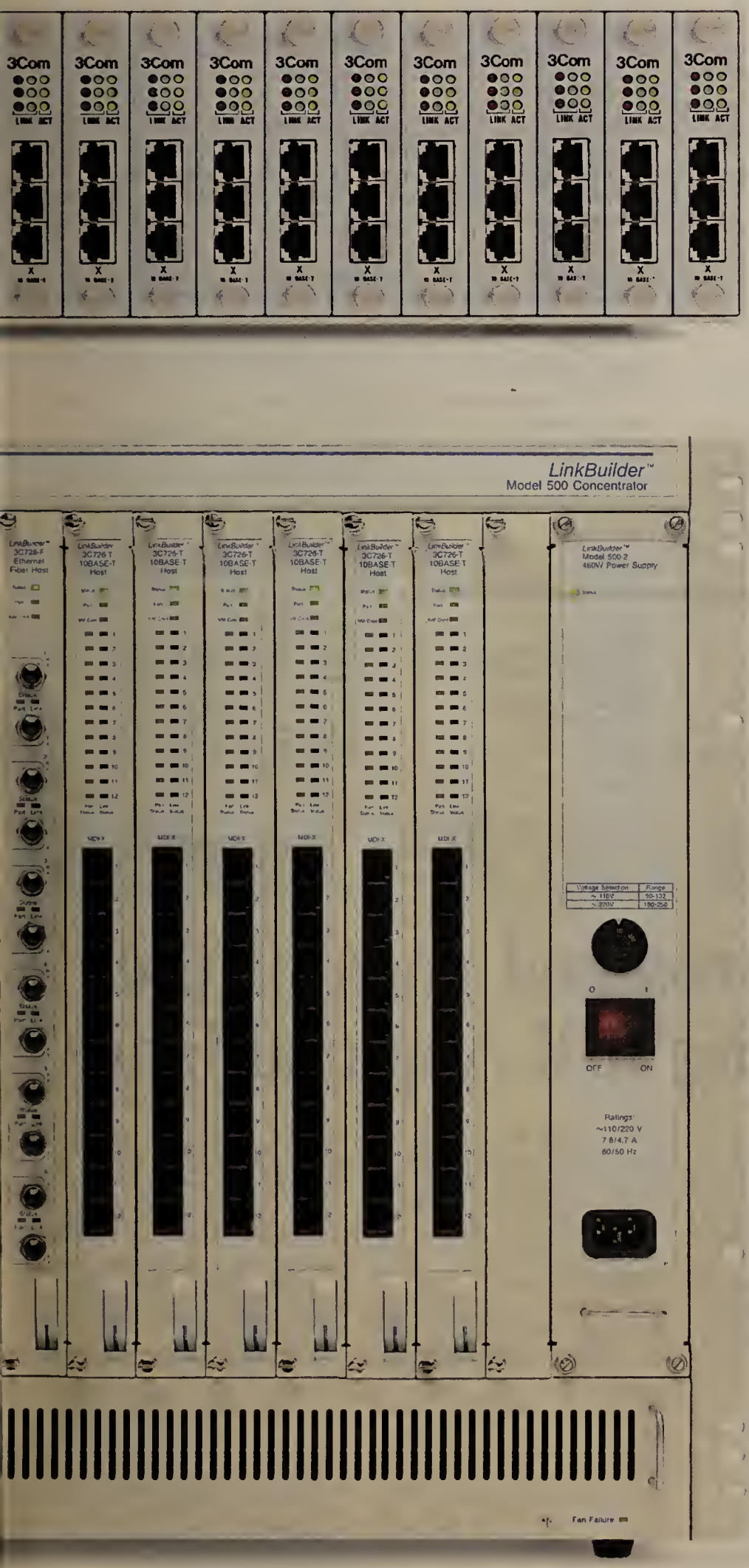

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Circle Reader Service #133

OPINIONS

LONG-DISTANCE CARRIERS

BY JAMES CARLINI

When evaluating vendors, look beyond price

When comparing the benefits of long-distance carriers' services and capabilities, some users get stuck on a single variable to evaluate vendors: price. In developing and evaluating criteria for requests for proposal, many users argue little points. Nine cents a minute vs. 9½ cents? This makes good reading to those that are evaluating vendors solely on price.

But what about other important criteria? What's behind the doors at the switching centers themselves? A cheaper price might mean less reliability and redundancy. A lot less.

How many of you have actually been through a switching center of the carrier you selected or recommended to senior management? You may have selected the carrier based on its bottom-line pricing without ever looking into the way it safeguards its network.

> A cheaper price might mean less reliability and redundancy. A lot less.
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Let's evaluate carriers from a different perspective: backup and redundancy of the switch facility itself. The Federal Communications Commission should set guidelines and standards on what an interexchange network facility should have in terms of backup. Vendor interpretations of what reliability and redundancy mean vary widely.

On a recent tour of AT&T's long-distance switching center in Chicago, the guide talked about the usual duplicated processors and power supplies that everyone would expect to find in major long-distance carriers' switching facilities.

One point the person made concerned the availability of spare parts for the switch that are on hand at any given time. In rough numbers, the spare parts inventory was worth more than $11 million, and there were two to six spares available for every circuit pack in the system.

Some might consider that many spares to be overkill. However, it seemed to me that it was only common sense. What if you get a batch of bad cards?

There were three backup tapes for the main processor and another off-site. The processor was fully redundant, and many in the tour were impressed with the magnitude of the overall redundancy of the facility, including electrical power.

Power was sourced from two separate grids, not substations, of the electric company. However, this was not really that impressive: This is the same type of redundancy you should insist on for your own computer and telephone facility. Get two separate central offices to feed your lines. Each long-distance carrier has some form of battery backup for their switch, but what do they have beyond that?

On this tour, I was impressed to find that the switching center was using a jet engine as a backup to their battery room. Actually, they had four jet engines that they could switch on to produce a total of one megawatt of power if they lose power from the electric company. What does your long-distance carrier use? That's a good question for your next RFP.

What about security? How secure is the toll office that your calls are going through? Security should be a concern as you evaluate long-distance and local exchange carriers.

Reliability, redundancy and resources are the three R's in an RFP that you should be looking for with long-distance carriers. The cheapest cost does not always mean the right choice.

Carlini is president of Carlini & Associates, Inc., a management consulting firm in Hinsdale, Ill. He also lectures on information technology at Northwestern University in Evanston, Ill.

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EDITORIAL

The pros and cons of the confusing IBM-Apple alliance

It's easy to support the recently announced alliance between Apple Computer, Inc. and IBM because it promises to improve interoperability between the two vendors' worlds. If the letter of intent is formalized, the partnership will develop microcomputer and network operating systems, available not merely to IBM and Apple, but to all vendors.

It's also easy to praise IBM's new efforts to cooperate with other firms. This year, Big Blue announced an alliance with Novell, Inc., and recently, deals were struck with Lotus Development Corp., Wang Laboratories, Inc. and Germany's Siemens AG.

Like IBM's increased support of standards, these ties promote a more open Big Blue. Fine, but aspects of the IBM-Apple deal should be treated skeptically.

First, the deal has been overly hyped. "It will change the face of the industry for years to come," wrote the *Chicago Tribune*. The *Financial Times* of London called it "one of the broadest collaborative technology pacts in the history of the computer industry."

Both statements are reminiscent of what Apple and Digital Equipment Corp. said of their development partnership, announced in January 1988. The first products of that agreement finally emerged last December, and the two companies are still a long way from fulfilling the nine separate networking goals announced at the inception of their partnership.

Then there's the question of how the IBM-Apple alliance will affect the development of OS/2, already troubled by a lack of installed base and by IBM's differences with Microsoft Corp.

In addition, because they are not specialists at developing operating systems for local-area networks, IBM and Apple may be tempted to invite a company that does specialize at this to join their partnership.

But if the chosen firm is Novell, smaller operating system vendors, such as Banyan Systems, Inc. could be hurt, thereby reducing competition and perhaps raising prices.

In sum, when IBM forms an alliance to offer new capabilities or to promote standard interfaces, it tends to help network users. But if IBM's real motive is to attack another company, users should watch out because the boons they are being promised may never materialize.

IBM's alliance with Apple surely seems to have interfaces and new functionality as its goal, but clearly it's also aimed at making IBM independent of Microsoft. If the real motive behind the IBM-Apple pact is IBM's anger at Microsoft, the agreement may last only as long as that anger.

OPINIONS

EDUCATION

BY NANCY NEEDHAM

Master of sciences degree beats an MBA

Is the MBA the best vehicle for success as a communications manager, or would you be better off with a master of sciences degree that combines MBA courses with technical courses? There's a lot to be said for taking the latter route.

The MBA has certainly become an accepted path into management and is likely to remain so. But MBA programs also reflect the current preoccupations of business overall. And these preoccupations, alas, are not very technical.

Traditional MBA programs grew from the premise that a good manager could manage anything. As long as one understood the essential functions of the business, success was possible.

But the study of computer and communications technology in MBA curricula was limited largely to its use and management in different industries. The focus was on the use of information, not on how to manage the technology responsible for storing, transmitting or analyzing that information.

Corporations spent a great deal of money on hardware and software, but the managers ultimately responsible for the information systems (IS) and communications functions were not techies; they were trained in accounting or finance, or had general MBAs.

For example, in early 1980, I had a meeting with the executive vice-president of a major financial services firm. He was supposed to figure out what to do with the firm's runaway computer and telecommunications costs. This executive, like many others, cut what he perceived as an unjustifiably large budget and started to farm out many of the firm's back room operations.

That wasn't a good decision in terms of the company's long-term ability to process customer orders in a cost-effective way. But it was understandable because the technical people were incapable of making their requirements intelligible to him and were unschooled in relating what they did to the overall objectives of the business.

> Technology is not for everyone interested in a management career.
>
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But not every company wants to farm out its operations. Most companies need to have a manager or several managers who understand what is involved in the selection and management of technologies suitable for handling the information needs of modern companies. It is not enough to let the telephone company handle it when information networks are required. And there is no single phone company to call, anyway.

If the networks represent a substantial portion of a company's capital investment program, communications managers with technical and managerial expertise are critical. Similarly, decisions regarding which computers to buy and how to connect them cannot simply be farmed out.

This means that whoever manages the communications function must understand not only communications technologies, but also business basics. This manager must be able to relate systems to business goals and strategies. A communications manager who understands marketing principles can better understand why a marketing manager wants particular reports in a particular form for customers.

Yet communications managers will do a better job of selecting and implementing corporate networks if they know how to assess competing technologies, how to deflate hype to get a true picture of a system's capabilities and how to take stock of what the company's real network needs are.

IS combines communications and computers in roughly equal conceptual quantities, so undergraduate degrees in computer science or electrical engineering, coupled with an MBA, can serve as a good background for the aspiring communications manager. But even with this background, a manager can feel the need for a better grounding on the communications side.

If the need for updating or upgrading technical expertise is combined with the need to understand management principles, then the next logical step should be a "technical MBA." But unfortunately, such an animal doesn't exist.

What does exist, however, is a master of sciences degree that combines the essentials of an MBA with the essentials of a graduate degree in computers and communications. The problem is such programs are not widespread. And as long as our national preoccupation with financial engineering takes precedence over real engineering, MBA programs will not add enough technologically based courses to their curricula to meet the real needs of communications managers.

Technology is not for everyone interested in a management career. But it does matter for those students whose ability to make the right technology choices will affect the profitability of their future employers.

Needham is academic director of the master of science program in telecommunications and computing management for the Center for Advanced Technology in Telecommunications at Polytechnic University in Brooklyn, N.Y. She has a master's and a doctorate in business administration from Harvard University.

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TELETOONS

BY FRANK AND TROISE

LETTERS

DeVry offers net degrees

Douglas Welch's column on education, "Colleges should develop network degree programs" (*NW,* June 17), was a welcome sight.

At the DeVry Institutes of Technology, we agree that advancing technology demands well-educated net administrators, and we are updating our bachelor's degree curriculum in telecommunications management to reflect this.

This summer, a new course is being written on local- and wide-area networking. Laboratories will be designed and installed in the fall, and the corresponding course and lab is scheduled to begin next spring. By that time, each of our four campuses that offer courses in telecommunications management will have a well-equipped networking lab.

Further plans for expansion will give our bachelor of science graduates in telecommunications management a full 10 credit hours in this specialty, complementing the nine other courses they are required to take in voice and data communications management and computers in the telecommunications management concentration.

At DeVry, one of the aims in all our business curricula is to be responsive to industry needs. In telecommunications, we seek to provide the networking knowledge this field requires. Currently, our telecommunications management curriculum is graduating almost 200 students per year from our campuses in Kansas City, Mo., Lombard, Ill., Los Angeles and Woodbridge, N.J.

Charles Koop
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A virus inoculation strategy for nets

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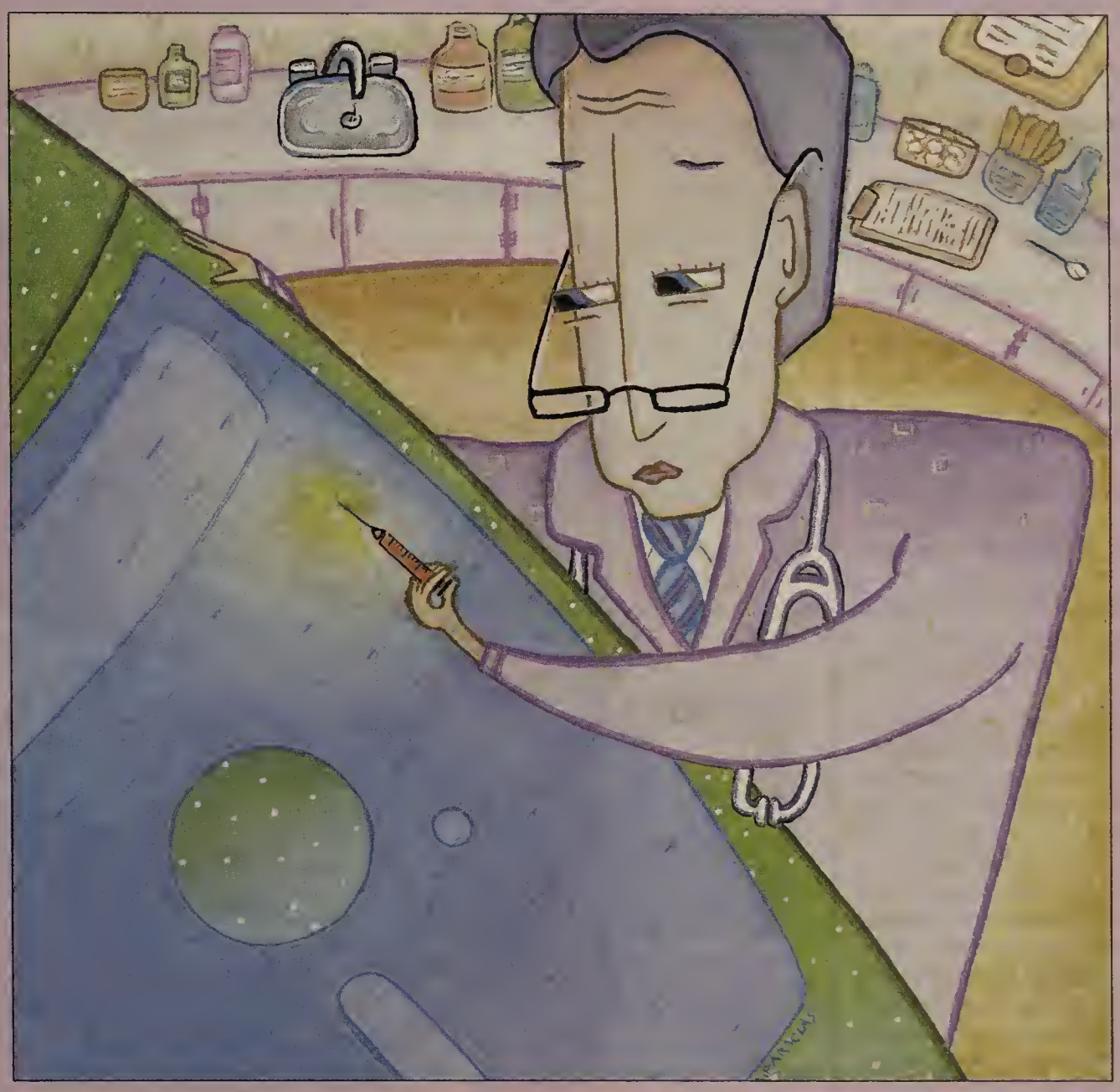

CONTINUED FROM PAGE 1

Security analysts say it's puzzling why more users haven't protected themselves. Lack of knowledge is not an excuse. Most net managers feel threatened by viruses, but the majority of managers *Network World* contacted for this article have no antivirus plan in place.

Some managers admit the plans they do have, such as a once-a-year check of local-area network workstations for virus infections, are inadequate. Among those managers who have antivirus strategies, the majority say they devised a plan only after their network was infected with a virus.

This lack of a coordinated response by net managers is more curious given that many users were hit by viruses last year. *Network World's* Critical Issues Survey ("Survey: Drawing a bead on net managers' top concerns," *NW*, June 3) found 32 of 100 network managers had a virus on their networks last year.

The Certus study, completed in March, found that 26% of 2,400 surveyed sites with 400 or more microcomputers were infected by a virus in the first quarter of this year.

And the situation is likely to get worse. Virus makers are becoming more prolific, experts say. They produced an average of one new virus every other day last year (see Figure 1, page 70). The National Computer Security Association, based in Washington, D.C., predicts this rate will rise to six new viruses per day this year.

Virus creators are also getting more sophisticated. They've introduced stealth viruses that hide their existence by masking changes in file lengths listed in a directory or by disinfecting themselves when read into memory. This latter technique prevents many antivirus software packages from detecting changes in a program that would indicate the presence of a virus.

What can users to do to protect their networks? Security analysts suggest drawing up a strategy based on three ideas.

■ **Realize the increasing value of data being stored on a LAN.** Until recently, LANs didn't maintain any data of real value to a corporation. With companies downsizing, this has changed.

■ **Get funding for antivirus equipment.** Develop a plan to justify the expense of virus protection to upper management.

■ **Implement a wide variety of virus protection tools.** No one product can keep all viruses off a network. Combating the problem requires a combination of products ranging from virus scanning software, which finds

(continued on page 50)

ILLUSTRATION ©1991 ANDREA FARACLAS

(continued from page 49)
infected files by checking for characteristic changes in a file's structure caused by known viruses, to equipment, software or a combination of hardware and software, which runs on servers to prevent unauthorized software from running on a network.

Will following these guidelines truly safeguard networks against viruses? An examination of each area in detail reveals that virus-free networks can be a reality.

"When LANs were used for printer sharing, [security] wasn't an issue," says David Jackson, vice-president of technical services at Micro One, a Dallas-based systems integrator.

With companies now running mission-critical applications on LANs instead of mainframes or minicomputers, this perception has changed. Data on the LAN now becomes more valuable and thus needs protection. "Now that LANs are used for data processing, [antivirus security] becomes an issue," Jackson adds.

Others agree. "Because of the value of information, we've had strong security tools for mainframes and good tools for minicomputers," says Tom Patterson, technical director in the information security business unit of Centel Federal Systems, Inc., a systems integrator in Reston, Va. "Information that companies use is just now moving to LANs. So LAN security becomes important."

> "Sharing floppies is about as safe as sharing needles," Springer says.
>
> ▲▲▲

Patterson explains that it's not necessarily more difficult to secure a LAN than mainframe- or minicomputer-based networks. "The security game hasn't changed a lot over the past 15 years," he says. "It's the same as it was with mainframes."

Net managers agree that security measures that would keep viruses off LANs are similar to measures taken to secure mainframe and minicomputer networks, such as requiring passwords to gain access to the network and assigning users different levels of access to network resources depending on their needs.

However, one net manager, who requested anonymity, says there is a difference with LANs. "In your [traditional information systems] center, you wouldn't allow a stranger to walk in, mount a tape and load programs onto a mainframe," the manager says. "Yet everyday, people carry floppy disks into work and load software onto LAN workstations."

This manager says he often ignored this type of behavior until his LAN was hit with a virus that was introduced into the network via infected software loaded from a disk. Now he has a different view.

Security analysts echo this concern. "Sharing floppies and using bootlegged software in a [LAN environment] is about as safe as sharing needles," says Patrick Springer, a consultant with Computer Task Group, Inc., a Needham Heights, Mass., management consulting firm.

Indeed, the sharing of floppy disks and the use of bootlegged software are the main sources of LAN virus infections, according to Centel Federal's Patterson.

Money matters

As the value of data stored on a LAN increases, many managers would like to see a corresponding increase in the amount spent on protecting it. But that has not happened.

"Many [net managers] are looking for ammunition to cost-justify [antivirus] security to upper management," Patterson says. "The only time they have good luck is when there's a publicized outbreak. Then they clip the stories and carry them to management."

Patterson and others note that for some industries, such as banking and government agencies, it's not a matter of money. These industries use the best precautions available because they are mandated to do so either by law, in the case of banks, or by federal or Department of Defense regulations, in the case of many government agencies. However, net managers in other industries are struggling with the cost-justification problem.

"When I ask for money, everyone seems to think viruses happen to other people's networks," says a net manager for a West Virginia chemical manufacturer who asked not to be identified. "Whenever there's a story on the front page of the *New York Times,* [upper management] gets concerned. But their concern soon fades, and I don't get the money I need."

For many net managers, the unfortunate truth is that until their network gets hit with a virus, they won't get the support they need. "There is a very laissez-faire attitude among those who have not had a virus infection," says John McAfee, chairman of the Computer Virus Industry Association (CVIA), based in Santa Clara, Calif.

How can net managers cost-justify adding security measures to their networks to protect them from virus infections? Point out the amount of downtime such attacks create, says Micro One's Jackson. When a virus outbreak occurs, often the entire network must be brought down to identify, isolate and eradicate the virus.

"It's very easy to justify the cost of se-

After July 4th, America's to have a lot

curity based on lost worker hours," he says. "It may be hard to estimate the value of lost data, but the downtime issue is easy to justify."

Consider the "worm" virus that struck the Internet in November 1988. The CVIA did a detailed breakdown of costs associated with the virus, which infected 7.3%, or 6,200 of the 85,200 machines on the network. Virtually the entire network had to be brought down, however, and examined for contamination.

The CVIA estimates end users lost over eight million hours of connection time to the network. And network operators and administrators spent about 1.13 million hours restoring the network to working condition.

The CVIA study conservatively estimates the total cost of lost access time and labor to restore the Internet at $98 million.

When put in those terms, spending between a few hundred and several thousand dollars to equip a LAN with antivirus software seems like a bargain. While there is no clear formula for cost-justifying such expenditures, net managers say one network outage from a virus can cost a company as much in lost worker hours as the price of the antivirus software.

Spending that money

Once net managers get financial support, there is still no clear path to virus-free networks.

"It's very difficult to buy a box to solve all your [virus] security problems," Patterson says.

Since viruses can infect networks in several ways, a combination of approaches and products is required. For instance, in addition to sharing floppy disks or using unauthorized software, viruses can enter wherever users are dialing out.

"Today, almost every network has a dial-out communications server from which users can easily download files from bulletin boards," Micro One's Jackson says.

Several net managers say they've lessened the risk of virus infection from this source by setting up their communications server so files are transferred to a workstation that is not attached to the network. The files are scanned for viruses before being uploaded to the network.

This isolation approach works for dial-out, but allowing users to dial into a network represents a more difficult problem. One approach is to set up a security server — a device that requires password authentication before the caller gets onto the network.

Examples of products in this area include Burlington, Mass.-based Xylogics, Inc.'s Annex three and Cambridge, Mass.-based Security Dynamics, Inc.'s ACE/Server.

Annex three is a Unix communications server that restricts access to sensitive host computers on a network. Users dialing into the server must enter a password. Password assignments can be for specific Annex three ports, which provide connection to different network segments.

Prices for the Annex three range from $3,995 for an 8-port system to $6,995 for a 64-port system.

The ACE/Server controls access to networks via a gateway, remote dial-up or direct connection by using a credit card-sized device that displays a code, which automatically changes every 60 seconds.

The server maintains codes for each card issued to users. A user trying to access network resources enters the code number displayed at the time of the attempted access. If the number does not match the code on a centrally administered system, access is denied.

> "It's very difficult to buy a box to solve all your [virus] security problems."
>
> ▲▲▲

The ACE/Server operates in Transmission Control Protocol/Internet Protocol environments and supports Unix servers, Sun Microsystems, Inc.'s SunOS, Digital Equipment Corp.'s Ultrix and other Unix server platforms. The ACE/Server is priced under $5,000.

The two security servers are examples of tools that prevent unauthorized users from gaining access. Since most viruses spread only when a program is run, blocking unauthorized programs from running on the network stops virus infections from spreading.

Net managers have a choice of products to keep such programs from running. There's a software-only approach offered by Tinton Falls, N.J.-based Brightwork Development, Inc.'s SiteLock program, and a software/hardware combination offered by Centel Federal's Net/Assure.

SiteLock, designed for Novell, Inc. NetWare networks, runs as a NetWare Loadable Module on servers running NetWare 3.x and as a value-added process for NetWare 2.x. Using SiteLock, a net manager would construct a list of programs that can be transferred from a local disk to the LAN. Unauthorized programs, such as those brought in by users on floppy disks, cannot be loaded on the network.

If a user tries to run an unauthorized program from a local drive on the net-

(continued on page 70)

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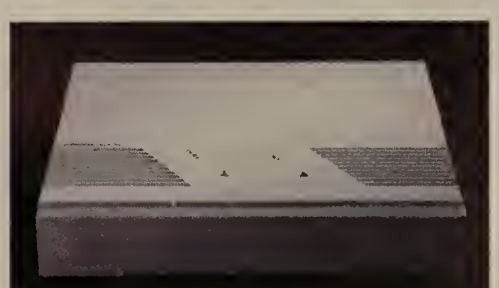

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Distributing the wealth

As applications continue to move from hosts to workstations, distributed management architectures are taking on greater importance.

Just as users found it beneficial to shift business applications from a host processor to networked distributed systems, so too have they gained from implementing a distributed network and systems management architecture.

The need for distributed management is being driven by the popularity of server-based data bases and groupware applications, as well as the corresponding decrease in mainframe-and minicomputer-based applications.

Distributed architectures enable users to split an application into several modules that run on separate computers and communicate over high-speed networks. These architectures are beginning to find a place in network management. In fact, there's a kind of race under way between the rollout of distributed systems to run second-generation business applications and the development of distributed management applications to control those systems.

The first-generation management systems developed in the 1980s paralleled first-generation business applications. Both were implemented on a single computer, usually a mainframe or minicomputer supporting attached terminals.

In the mid-1980s, business applications moved from host processors to distributed systems. The same migration is now taking place in the management arena, thanks to the introduction during the past few years of distributed management architectures, such as Hewlett-Packard Co.'s OpenView, Digital Equipment Corp.'s Enterprise Management Architecture (EMA) and Sun Microsystems, Inc.'s SunNet Manager.

Furthermore, the Open Software Foundation (OSF) is in the final stages of specifying a standard set of services for its distributed management environment (DME).

The DME architecture, expected to be announced in September, will pave the way for widespread adoption of the distributed management approach.

The distributed revolution

The need for distributed management stems from how local-area networks revolutionized the way people use computers.

In every application, distributed approaches are being used wherever a fresh start can be justified because they enable users to go beyond client/server computing. Partitioning an application into many software modules allows a local server to start a task and forward commands across the network, instructing a remote server to complete it.

The client/server architecture forms a tight bond between a server and multiple microcom-

(continued on page 54)

Herman is a principal with Northeast Consulting Resources, Inc., a Boston consulting firm that focuses on strategic management and information technologies.

By JAMES HERMAN

ILLUSTRATION ©1991 DAVE CUTLER

(continued from page 53)
puters or workstations. Clients and servers can exchange data, but a client cannot, for example, rely on a server to complete a task it has started.

In distributed architectures, the boundary between the client and server is more flexible, allowing most of the software modules composing an application to be duplicated and run in both clients and servers. Thus, the distributed application approach will cause the number of servers in a network to grow rapidly, creating a new kind of management problem — distributed systems management.

As the enterprise increasingly uses distributed systems technology, network and systems management must similarly become increasingly distributed.

Network management becomes stressed when distributed applications, which demand high performance, are used heavily. At the same time, network management in a distributed systems architecture turns into systems management because the servers and clients must also be managed.

In addition, with software distributed across all of these clients and servers, new requirements for software configuration management, remote monitoring and performance tuning capabilities are being created.

The new distributed management systems are still immature, however, and their capabilities are limited. But pressure to deliver management solutions based on distributed systems technology will rise as use of distributed application approaches increases.

Distributed management also enables corporate information systems (IS) departments to gain some form of management control over microcomputer LANs while enabling the departments that installed them to retain some autonomy and self-reliance.

Each enterprise works out its own division of responsibilities between the management center and the department, and no single paradigm applies across the board.

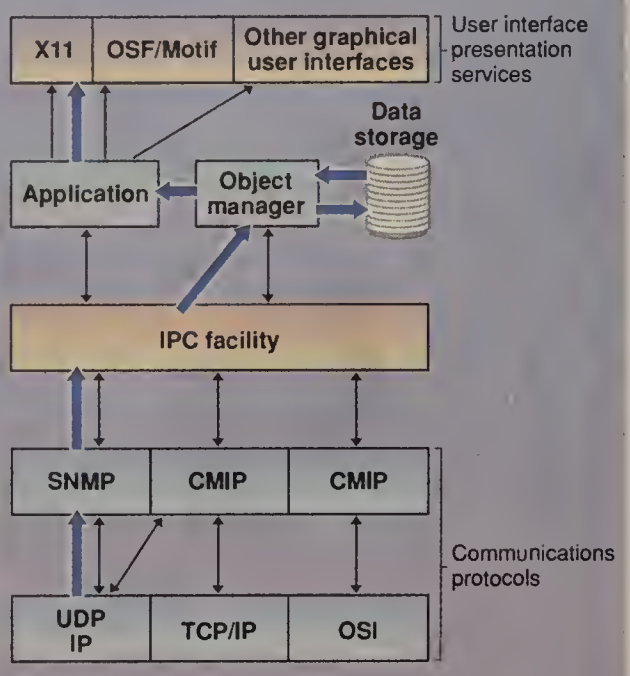
In general, it is no longer possible to define clean, clear points of demarcation indicating whether IS or another department is responsible for certain management functions. Instead, many different groups may need access to the same troubleshooting and performance information because simple problems can be solved by a department, while others need the expertise of IS personnel.

In this era of shared management responsibility, where many prevailing organizational models for splitting up management duties exist, a management architecture must put a premium on flexibility.

And flexibility is what distributed architectures are all about.

How a distributed management system works

Figure 1



CMIP = Common Management Information Protocol
IPC = Interprocess communications
SNMP = Simple Network Management Protocol
UDP = User Datagram Protocol

Distributed management software architecture enables a mix of communications protocols to shuttle SNMP or CMIP data between network devices and the management workstation, while an IPC facility passes data between software modules. The process depicted here shows how SNMP data encapsulated in UDP packets is processed.

GRAPHIC BY SUSAN SLATER SOURCE: NORTHEAST CONSULTING RESOURCES, INC., BOSTON

Distributed architectures

In a distributed approach to network and systems management, the management software is broken into modules that are linked using some type of interprocess communications (IPC) facility that can operate over a network. That means software modules can be located on separate computers and function as if they were all on one.

Essentially, the software does not know if it's located on one or more computers. This enables users to expand the power of a management system by adding more computers to maintain an acceptable performance level. In the past, users would have had to move the management system up to a more powerful single processing unit in order to accomplish the same goal.

Distributed architectures also make the management system more reliable because a failure of one computer will not completely disable the management system, as would be the case if the system were run on a single computer.

For example, HP's OpenView software is a distributed management architecture that runs on HP workstations and minicomputers as well as Sun workstations. IBM and HP are jointly developing a version of OpenView for the IBM RISC System/6000 workstation.

OpenView is typical of the new distributed management systems, which are mostly implemented on Unix, use the X Window System user interface standard and are being ported to many vendors' hardware.

In Figure 1 on this page, we see the basic architecture of a distributed management architecture. In OpenView, software modules are interconnected via an interprocess communications facility HP calls the Distributed Communication Infrastructure (DCI).

The DCI serves as a switchboard that passes information between modules supporting various communications and management protocols that pass management data from devices to management workstations, data storage services, user interface services, object managers and management applications.

For example, a workstation linked to a Transmission Control Protocol/Internet Protocol network can receive Simple Network Management Protocol (SNMP) data from network devices wrapped in a User Datagram Protocol (UDP) packet. A communications module unwraps the UDP packet and passes SNMP data, such as an alarm reporting a failed device, to the SNMP module.

Information about the failed device is stored in a data base. The DCI makes sure that data is passed to the application, which instructs the user interface to display the alarm and information about the device on the workstation screen.

Since all module-to-module communications goes through the DCI, modules can be spread across a number of servers. These servers can be linked by some form of LAN interconnection protocol, such as IP, and would not have to be located at the same site.

Yet the DCI enables all these management servers to communicate with one another and function as a single system, sharing configuration information data bases and updating common historical files. They can also send alarms to one another, keeping the different pieces of the overall system informed of conditions in the network.

Beyond client/server

Distributed architectures go beyond client/server, but they generally include the client/server dichotomy in their software.

For instance, user interface software in the new architectures resides on a user's desktop client and can be separate from the common portions of the management system, which reside on management servers.

With a distributed management architecture, users can dedicate different systems to perform various functions, as shown in Figure 2 on this page. A central-site minicomputer could be dedicated as a data base server, maintaining network configuration information.

A low-end microcomputer at a remote site could be configured as an alarm server that receives all alarms issued by devices at that site. Those alarms can be forwarded to the minicomputer, which would pull information about the device from the data base and forward it to local or remote clients configured to receive notification when that device trips an alarm. Those clients would then display the alarm to network operators.

Remaining modules, such as a trouble-ticket application that tracks historical problems with certain devices and logs all problems as they occur, might run on a central-site workstation that maintains the data bases and user interface. If the trouble-ticket system becomes widely used, the historical data base of problem records can be stored on the minicomputer, while the user interface remains on one or more clients.

A critical alarm might then flow from the alarm collection server to the minicomputer, where a problem record would be created automatically. The alarm would then be sent to one or more operator workstations where network status displays are running. Central-site personnel could use the trouble-ticket clients to call up a copy of the trouble ticket to make sure required work has been performed.

All this enables users to put management functions on low-cost workstations at the locations where they are needed, while maintaining some form of centralized control and management data collection.

Many ways to distribute

While the distributed management systems of British Telecommunications PLC, Cabletron Systems, Inc., DEC, HP, Nynex Corp., Sun and Tivoli Systems, Inc. can be used to build the type of applications discussed above, each uses a different IPC facility.

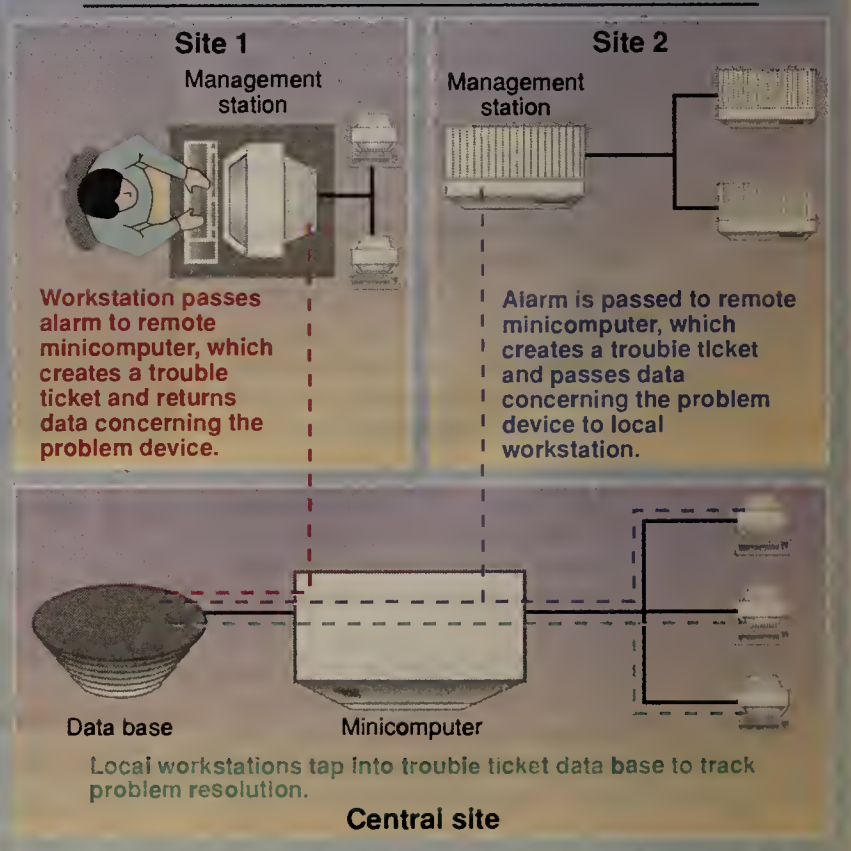
HP's DCI implements a variant on the Open Systems Interconnection Common Management Information Protocol (CMIP) as its way of communicating between modules.

DEC's EMA and Sun's SunNet Manager use remote procedure calls (RPC), Tivoli's WizardWare uses an object-oriented message passing approach, while the remaining systems use a vendor-

(continued on page 58)

Distributing management functions across the network

Figure 2



Remote procedure calls enable a software module on 1 system to issue commands over a network that instruct a module on another system to complete a task.

GRAPHIC BY SUSAN SLATER SOURCE: *NETWORK WORLD*, FRAMINGHAM, MASS.

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U.S. to study Soderblom token patent

By Laura DiDio
Senior Editor

WASHINGTON, D.C. — In a move that could spell trouble for Olof Soderblom's token-passing patent and monetary relief to his 50 licensees, the U.S. Patent and Trademark Office has agreed to reexamine the validity of Soderblom's patent.

In its 154 page decision, the Patent Office stated that the reexamination request from an anonymous vendor was granted in view of earlier patents issued to four engineers — including two from AT&T Bell Laboratories — before Soderblom was granted his patent in 1981.

"A substantial new question of patentability affecting Claims 23 to 33 of U.S. Patent No. 4,493,948 to Soderblom is raised by the request," the Patent Office statement said.

The 10 claims in question deal with open and closed data transmission loop schemes and are central to the issue of whether Soderblom's existing patent is applicable to today's token-ring and Fiber Distributed Data Interface local-area network technologies.

Invalidation of the patent or amending even portions of the patent could effectively render null and void the current licens-

(continued on page 62)

DEC describes benefits of X.500 directory services

X.500 will extend DNS offering to incorporate non-DEC devices in DECnet Phase V directories.

Q: Later this year, Digital Equipment Corp. is expected to announce DECnet Phase V, a major revision of its network software that will support the full suite of Open Systems Interconnection protocols.

According to Jane Brewer, DEC's product marketing manager for enterprise networking within DEC's Telecommunications and Networks Organization, one key component of that announcement will be support for the X.500 directory services standard, which promises to give network administrators greater control over the hardware and software elements in their networks.

In an interview with *Network World* Assistant Managing Editor Charles Bruno, Brewer described the full potential of X.500 directory services and laid out DEC's strategy to support the technology within DECnet Phase V.

(continued on page 59)

Microsoft to market LAN Manager direct

Software giant to sell NOS to Compaq resellers to stabilize LAN Manager camp, jump start sales.

By Laura DiDio
Senior Editor

REDMOND, Wash. — In an attempt to boost lagging sales of its LAN Manager network operating system, Microsoft Corp. last week announced it will sell a version of the product directly to select Compaq Computer Corp. value-added resellers.

Microsoft's decision to put its marketing muscle directly behind LAN Manager is viewed as crucial if the product is to compete successfully with Novell, Inc.'s NetWare, which commands 60% of the network operating system market today. LAN Manager has only been available through OEMs to date.

"By selling its own version of LAN Manager, Microsoft is giving users freedom of choice," said Craig Burton, executive publisher of the *Clarke Burton Report*, a monthly research magazine. "Users will no longer be constrained to buying versions of the product that only work with a particular OEM's hardware. This will help accelerate the acceptance of LAN Manager."

Jonathan Yarmis, vice-president of the personal computer service at Gartner Group, Inc. in Stamford, Conn., agreed. "The move solidifies and stabilizes the LAN Manager camp and will spur application development.

"Microsoft and its OEMs have to present a unified front, especially in light of Novell's merger

(continued on page 6)

Net execs try to tame fax monster

By Tom Smith
New Products Editor

The explosive growth of facsimile machines has created a costly monster of which few companies are aware, let alone able to control.

Most large companies don't even know how many fax machines they have or how much they are spending on dial-up fax transmissions.

"It's like trying to manage envelopes or pieces of paper," said Bob Craig, vice-president of international network planning for The Chase Manhattan Bank, N.A. in New York. "People don't think it's worth the cost of managing it."

Yet the costs can be staggering. Annual transmission costs can be in the tens of millions of

(continued on page 8)

NETLINE

AT&T TRIDOM plans to trial a pan-European VSAT network with two users. Page 2.

A TARIFF IS USER is the loser in a heated battle between MCI and AT&T. Page 2.

VENDORS AIMING for FDDI interoperability form a testing consortium. Page 2.

3COM ELECTS Benhamou to the post of president. Page 4.

AMEX AWARDS MCI with a service contract that could be worth up to $100m. Page 4.

US SPRINT EXTENDS VPN services into international markets. Page 4.

PRIVATIZING TELECOM in Eastern Europe is a question of capital. Page 45.

NEWSPAPER

FEATURE

Telecom privatization will aid int'l users

By Norman Lerner
Special to Network World

Most countries — industrialized, developing, capitalist and socialist — are at some stage of restructuring their telecommunications systems in order to accommodate and take advantage of the great political and economic changes now sweeping the globe.

In many places, this restructuring is taking the form of privatization of formerly nationalized telecommunications systems. This important trend raises major questions for multinational users of telecommunications services including: Where is this happening and why? How will it affect the way we do business? And what will be the long- and short-term effects on telecommunications services to and from these countries?

This article examines the trend toward privatization in

(continued on page 38)

The results are in and **Network World** is the clear leader. The 1990 Wall Street Journal/ICA Member Study is conducted among members of the prestigious International Communications Association (ICA), an organization whose representatives purchase $16 billion of information technology products and services each year.

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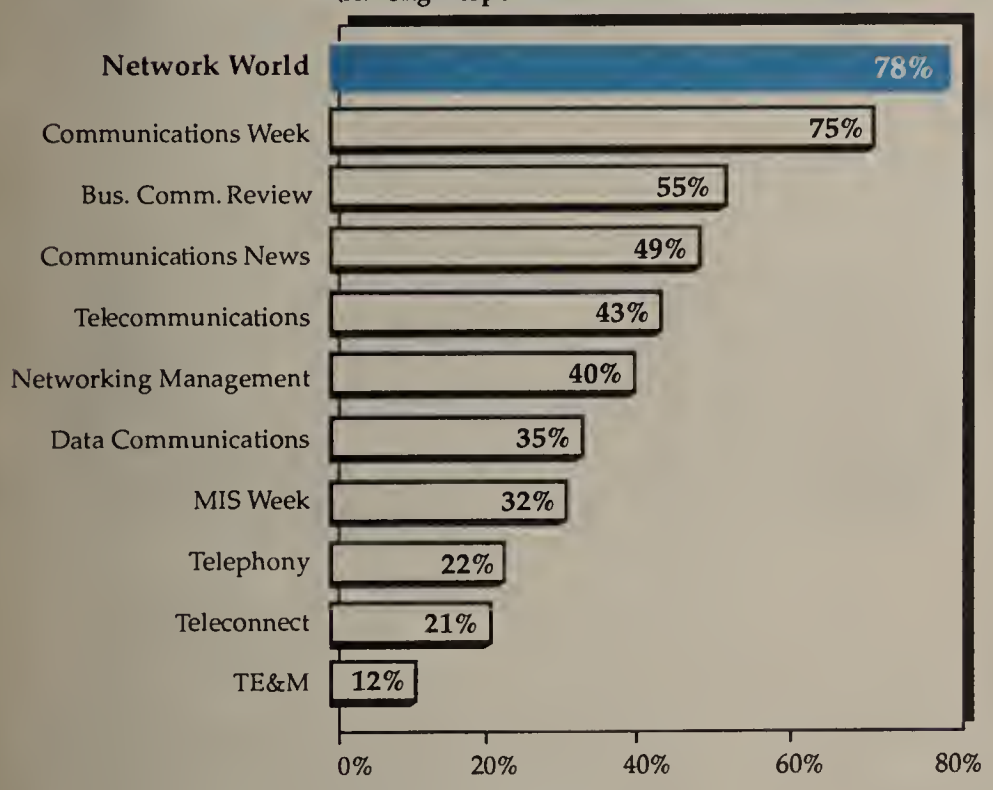

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International Regular Readership

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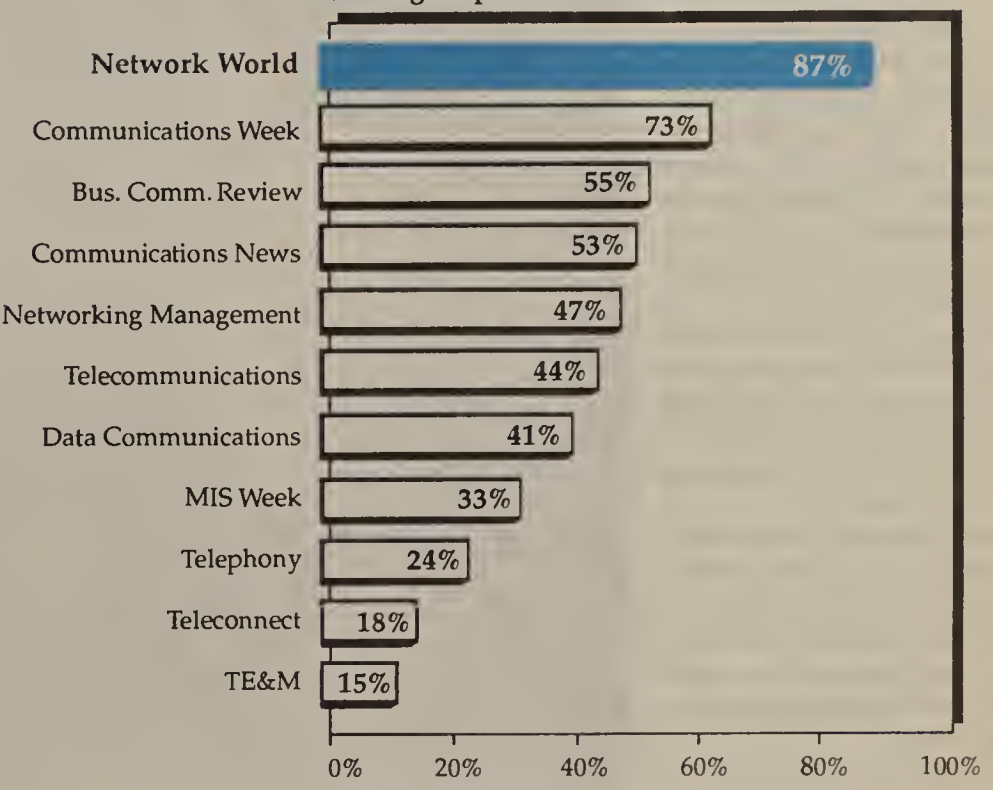
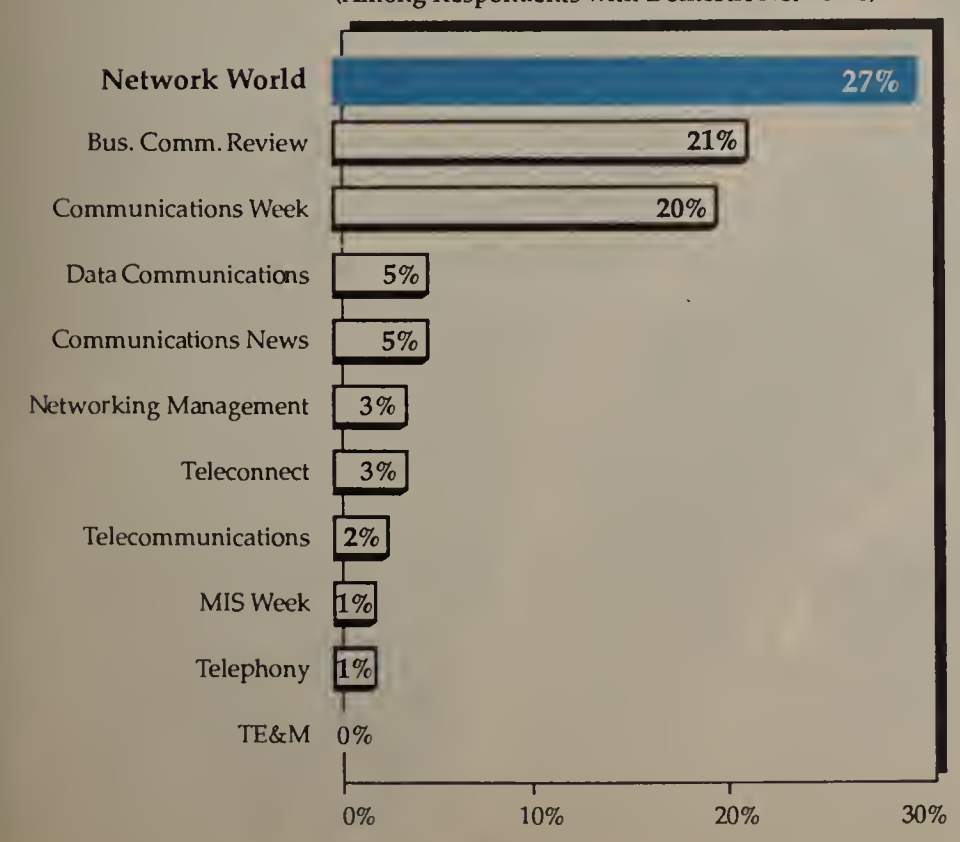


Base: 165 Respondents
Regular readership is at least three out of four issues.

Domestic Most Important/Useful

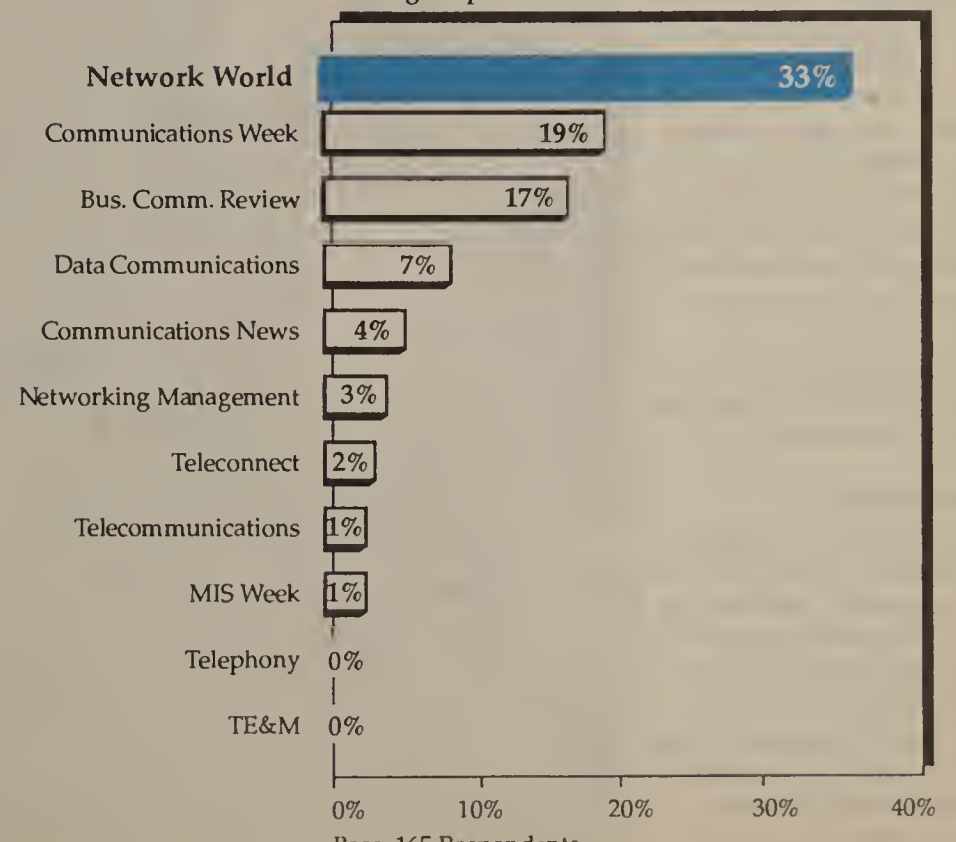
(Among Respondents with Domestic Networks)



Base: 336 Respondents

International Most Important/Useful

(Among Respondents with International Networks)



Base: 165 Respondents

Source :1990 Wall Street Journal / ICA Member Study

(continued from page 54)
specific IPC, which allows them to write their software to an interface that is independent of any operating system.

Vendor-specific IPCs make it easier to port the software to new hardware. HP, British Telecom and Nynex are working to deliver versions of their management systems that run on workstations from a variety of vendors, including DEC, HP, IBM and Sun.

The RPC approach

The RPC mechanism appears to be gaining the most acceptance. It is a generalized version of the standard subroutine call mechanism used in most modular software programming systems. In an RPC environment, one module can call another, pass arguments to it and receive return values, even though the two modules reside on different computers.

The same procedure call also works if the modules happen to be on the same computer, making it possible to change which system runs which modules without any recoding. RPC-based distributed management architectures have special appeal for managing distributed systems. In these architectures — of which SunNet Manager is the best example to date — the management system itself can actually be extended into the system being managed because of the RPC.

In this approach, classic management protocols, such as CMIP, are actually eliminated and replaced by subroutine calls between the management agent and the rest of the management system.

The simplicity and unity of this approach is appealing, but it only applies to managing distributed workstations or larger computers and won't apply more generally to managing network elements such as switches, multiplexers or bridges.

The problem with the RPC approach in particular, and distributed management approaches in general, has been that, until recently, no industrywide standard existed for these new technologies. Sun's RPC, which is part of its Open Network Computing distributed computing architecture, is the most widely used but is not available on all major workstations.

During the past two years, OSF has begun to address the need for standards in these areas.

OSF's standards

With its Distributed Computing Environment (DCE), OSF has defined a general standard for distributed computing that will span most, if not all, leading computing platforms.

At the moment, it appears that DCE will become the leading distributed computing platform during the next three years, given the support it has from DEC, HP, IBM and others. OSF's DCE is based on RPC mechanisms and includes a distributed file system, a distributed authentication system and a distributed directory system.

The success of DCE will create the need to manage distributed systems, which is why OSF is defining its DME. At the moment, OSF is reviewing the distributed management products of several vendors — including OpenView, DEC's DEC Management Control Center (DECmcc) and WizardWare — and will select one vendor's architecture or meld different vendor approaches.

Although OSF is concerned with managing systems that will use DCE, there is strong support for this effort throughout the industry, and OSF's standard is likely to be widely adopted for a broad range of management applications.

Object-oriented approaches

WizardWare represents the latest trend in distributed management approaches: the aggressive use of object-oriented programming techniques.

In object-oriented programming, software is attached to data structures called objects. Instead of using calls with traditional software modules, object-oriented systems send messages from one object to another. These messages can activate a specific software routine associated with the receiving object.

The object-oriented approach is especially applicable to the

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needs of management systems because most use an object-oriented data definition methodology to specify the management information processed by the system and stored in its data bases. CMIP, for example, is an object-oriented management protocol.

The message-passing approach to intermodule communications may replace the use of IPCs and RPCs, or it may be layered on top of them. The approach is so new that there is no accepted way to use it.

The OSF has shown an interest in adapting distributed object-oriented approaches to the needs of its DME and to using more traditional modular programming coupled with an RPC. The object-oriented approach allows for the encapsulation of software within an object and the ability to introduce many slight variants on an object — each with its own distinct software routines — with minimal recoding.

Other components

RPCs and object technology are not the only things needed to make distributed management software work.

Perhaps the greatest challenge for distributed management architectures comes in building the configuration and inventory data bases that are at the heart of these systems. Almost all of the new management systems are built around a relational data base management system, although a few, such as DEC's DECmcc, are using an object-oriented DBMS.

The object-oriented approach to management data definition makes relational DBMSs less than ideal for many functions, such as configuration management.

By contrast, other functions, such as historical recording of performance data, may still be best performed with relational technology. Thus, it is likely that both kinds of data base technology will be routinely employed in the same system.

So far, few, if any, management systems are able to distribute the management data base. This is largely because distributed data base systems are still not completely functional. Thus, the data base is the Achilles' heel of distributed management approaches because the entire data base must be kept on a single server, which can quickly become a performance bottleneck.

Because the data base cannot be distributed, the performance of the system when operating across the wide area is also severely limited. This means the new distributed managers are limited to workstations linked over high-speed LANs in a building or campus environment. As advances in the area of distributed data base technology are made, they will quickly find application in the new management systems.

There are many advantages to the new distributed management architectures. First, they can exploit high-powered workstations, where reductions in the cost of cycles are coming fast and furiously. Hence, distributed management systems will be far less expensive and far more powerful than centralized management.

Second, the software development tools in the workstation environment are excellent, and programming productivity is correspondingly high. Therefore, distributed management systems are likely to advance in functionality and features more quickly than their older, centralized cousins.

Lastly, the distributed approach produces a management system that is more reliable because it is spread out across many workstations and is not susceptible to a single point of failure.

In short, the same downsizing and distributing process seems likely to occur with management applications. It is increasingly difficult to see why a large, expensive, centralized mainframe or minicomputer will be needed to run tomorrow's management applications.

It also seems inevitable that the best new management software will be targeted to distributed management platforms. Therefore, users should seriously plan for a transition from current management approaches to distributed ones.

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Worth winding toward OS/2?

IBM has made many promises about OS/2, but there's still no reason for users to rush to this choice.

By EDWIN MIER

The past 10 months have seen more moving and shaking in the field of personal computer operating systems than in the previous 10 years.

Due to the growing diversity of options, users with large numbers of IBM personal computers are discovering they must have an operating systems strategy in order to guide their organization's future course, to achieve economies of scale and to ensure software compatibility and applications portability.

In implementing this strategy, should users stick with plain old MS-DOS — at least for the time being? Should they move to Microsoft Corp.'s Windows 3.0? Should they choose IBM's newer personal computer operating system, OS/2? Or wait for something to emerge from IBM's planned joint venture with Apple Computer, Inc.? Or should they perhaps consider switching to Unix?

In answering these questions, network considerations are definitely involved. Indeed, the choice of a corporatewide personal computer operating system may affect both local- and wide-area network plans for years to come.

At the heart of the controversy is OS/2, which plays a major role in IBM's strategy for Systems Network Architecture environments, LANs and multiprotocol networks. For example, in March,

(continued on page 63)

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based networking consultancy.

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(continued from page 61)

IBM announced Advanced Peer-to-Peer Networking (APPN) for OS/2 Extended Edition. IBM also offers a Transmission Control Protocol/Internet Protocol support package for OS/2.

APPN support for OS/2 seems to take a big step toward IBM's envisioned future network structure — a giant network of peers, which IBM strategists have long insisted requires a robust multitasking operating system on every desktop.

DOS' successor

Multitasking is just what OS/2, IBM's designated successor to DOS, offers. DOS, meanwhile, is only an 8-bit, single-tasking operating system that delivers a fraction of the power of the newer personal computer platforms designed for 32-bit operation, such as those based on Intel Corp. 80386 or 80486 processors.

Performancewise, OS/2 is in many ways years ahead of DOS. But despite its technical advantages, OS/2 has languished so far. There are three reasons buyers have been reluctant to commit to OS/2: its relatively high cost; the significant amount of microcomputer memory it requires; and the fact that OS/2 versions shipped so far offer only rudimentary backward compatibility with DOS applications.

> "I think Microsoft's OS/2 Version 3.0 is a figment of someone's imagination right now."
>
> ▲▲▲

Nevertheless, IBM remains ardently committed to OS/2 and is currently preparing OS/2 Version 2.0. Big Blue says this new release will be generally available by year end, but it hasn't yet issued the usual "here's what's coming" software specifications on Version 2.0. Some IBM observers say this may indicate problems remain to be worked out before the next release's basic features are fully defined.

Meanwhile, Microsoft, in what many view as a war of vaporware one-upmanship, is countering with boasts about its next version of OS/2, Version 3.0, which some users don't expect to see before 1993.

"I think Microsoft's OS/2 Version 3.0 is a figment of someone's imagination right now," says Richard Finkelstein, president of Performance Computing, Inc., a data base consulting firm in Chicago that is a heavy user of both OS/2 and Unix servers. "It's a wish list for where [Microsoft] expects [OS/2] to go in a few years. I don't expect to see it in 1992."

Workstation vs. server

Although managers may not want to mandate a single operating system for all desktop workstations in their enterprise, the need for consistency and commonality is forcing a selection. That choice — from a plethora of options available (see chart, page 67) — is crucial to network users' concerns and planning.

The operating system that personal computers run defines the application software that is purchased or written. It also determines the LAN operating systems that can be used. These factors, in turn, affect network traffic and performance, and even determine to a large degree the network- and transport-layer protocols that can be used.

In comparing personal computer operating systems, a distinction needs to be drawn between the two very different network identities that personal computers assume today — workstations and servers. In the mid-1980s, LAN workstations generally doubled as servers.

Back in those days, all personal computers ran DOS, largely because few alternatives existed. Since then, however, personal computer operating software has become specialized into systems for workstations and systems for servers, which now are invariably dedicated nodes.

Workstation software developers have focused on making the personal computer's user interface easier to use. Their efforts essentially mimicked Apple's Desktop graphical user interface, introduced in the early 1980s, which features icons and mouse-driven, pull-down menus.

Ironically, the planned IBM/Apple development accord could yield a consistent and de facto standard graphical user interface in a few years.

IBM's 1987 announcement of OS/2 Extended Edition, featuring Presentation Manager, represented the vendor's shot at delivering graphical user interface functionality to workstation users. Presentation Manager supported the same mouse-driven, pull-down menu operation as Apple's Desktop for OS/2 applications that were written to it.

Unfortunately, no applications were written to Presentation Manager when IBM first announced OS/2 and only a handful had been announced by early 1989 when OS/2 began shipping.

Indeed, OS/2 applications still have not achieved critical mass; only 200 applications have been written for it, compared to the nearly 10,000 written for DOS and Unix.

At the same time it was trying to estab-

(continued on page 67)

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An expectation.

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For a new technology, SAA has been surprisingly versatile, in part because SAA makes it easy to plug in modules. The word processor for the underwriter workstation was purchased from one vendor, the help system from another, and both were integrated with MetLifc's application.

A reaction.

"But the important thing to know about our move to SAA," according to Mr. Cavanagh, "is how we're doing it. Wc don't have a timetable for going 'all SAA.' That's not realistic. What we do have is a plan to create SAA applications as needs arise. We're showing thc underwriter's application around the company and already pcople arc saying, 'That's great, how can I get something like that?'

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(continued from page 63)
lish the multitasking OS/2 as the new direction for personal computer operating systems, IBM also embarked on a new personal computer hardware direction with its Personal System/2 line.

Unfortunately for IBM, the combination was too much of a deviation from the familiar personal computer and DOS world. IBM's abandonment of the Personal Computer, XT and AT, which it stopped producing when the PS/2 was announced, left a gap in the personal computer market that IBM Personal Computer clone manufacturers wasted no time filling.

And OS/2 went nowhere, which left a big market opportunity for a company that could deliver an affordable graphical user interface to personal computer users in a form not too far removed from DOS.

Then along came Microsoft's Windows, now available in the highly popular Version 3.0, to provide personal computer users with a graphical user interface for workstations at an affordable price — about $100. Windows runs atop DOS and on most personal computers, but not on all (see chart, this page).

DOS applications can even run concurrently (although not simultaneously) with Windows applications, though some performance degradation occurs. And while Windows does not perform multitasking, it permits toggling between multiple applications, which is a satisfactory alternative for many user environments.

At last count, Microsoft had sold about three million copies of Windows — 10 times more than sales of OS/2 to date.

No Windows on servers

As a workstation operating system, the Windows/DOS combination is clearly the leading contender. But the fact that Windows runs on top of DOS, which endears it to the vast installed base of personal computer users, also limits Windows' use in power applications, such as on a LAN server.

"Windows is not useful as a server operating system," says Ron Corriveau, a management consultant with Berlin, Mass.-based ARC Associates who has done extensive performance testing with DOS, Windows and OS/2, including a prerelease of IBM's upcoming OS/2 Version 2.0. "If you really need to do simultaneous real-time multitasking, Windows runs out of steam."

Corriveau explains that a character-based application written to run under Windows requires somewhat more memory than that same application under DOS because with Windows, "you're representing pixels, graphic pictures, instead of characters. There is a lot of high-resource overhead."

Another problem with Windows is memory management. Specifically, there are few inherent safeguards to prevent one application in one window from overlapping and then corrupting the code or data of another application in another window.

"Windows puts pieces of code into any available RAM, and then it swaps them out on a least frequently used basis," Corriveau says. As long as there's enough memory, everything is fine. But if available memory runs low, the result is an Unrecoverable Application Error (UAE), which locks up the system and requires the user to reboot. Any work in progress at the time is usually lost.

After trying and then abandoning Windows, Performance Computing's Finkelstein says his company now works mainly on OS/2 and Unix servers.

"We kept getting UAEs with Windows," he says. "Every application we used locked up within 15 minutes."

How much memory is sufficient for Windows? It depends on how many concurrent windows and applications need to be supported. "A 286 with 4M bytes [of RAM] does Windows very nicely," Corriveau says. But some power users complain that they may run out of available system resources on an 80386-based platform with 8M bytes of RAM under Windows.

OS/2 is much better suited than Windows as a server operating system. OS/2 Standard Edition, in fact, has been the basis for a half-dozen vendors' LAN-server software packages, including 3Com Corp.'s 3+Open. (Microsoft's OS/2 Standard Edition doesn't include the Database Manager and Communications Manager that IBM has bundled with OS/2 Extended Edition.)

Test labs generally agree that Novell, Inc.'s NetWare 386, which runs on an 80386 or 80486 platform, will outperform OS/2's current Version 1.3 in a similar environment. This is likely due to the fact that the current OS/2 was structured for a mixed 16- and 32-bit operational environment, while NetWare 386 was designed for a full 32-bit environment.

Personal computers include the hardware platforms built around the family of Intel microprocessors ranging from the 8-bit Intel 8088 of the original IBM Personal Computer series to the 16-bit 80286 of the IBM Personal Computer AT to the 32-bit 80386 and 80486 processors that underlie an increasing percentage of LAN microcomputer-based servers today.

If IBM had made OS/2 to run at full throttle in a 32-bit environment, the operating system would not run on 80286-based systems. However, when IBM introduced OS/2, 80286-based Personal Computer ATs were the most prevalent personal computers. Today, 80386-based systems have become virtually commodity purchases and a number of 80486-based Personal Computers are now elbowing their way into the server role.

While 80386-based systems still account for just a fraction of the vast installed base of 8088- and 80286-based personal computers at the desktop, 80386-based systems are now the LAN server platform of choice.

Banking on Version 2.0

If half the hype about the forthcoming OS/2 Version 2.0 is to be believed, the product could finally position OS/2 as a viable contender for both workstation and server roles.

IBM has taken its lumps with the current OS/2 and gone back to the drawing board. Based on the latest reports from sources who have seen or worked with prototypes, Version 2.0 corrects virtually every major criticism users have had about IBM's original OS/2. Specifically, OS/2 Version 2.0 will:

- Be a full 32-bit operating system. It will run only on 80386- and 80486-based platforms, but performance should be significantly improved.
- Be unbundled from the Communications Manager and Database Managers that are now inherent components of OS/2 Extended Edition. Some of the functionality of the Communications Manager may still be included, but it is likely to be a streamlined version of what's currently included with Communications Manager. The Presentation Manager portion, or the equivalent functionality, would still need to be included.
- Need less memory to run, making it more attractive in the workstation role. "I've heard you can run [OS/2 Version] 2.0 in 2M bytes of RAM, but I really doubt it," Corriveau says. "It's probably a 4M- to 6M-byte operating system."
- Do Windows. The current OS/2 provides what IBM calls a "DOS compatibility box," which enables OS/2 to also run a single DOS application.

However, there were some problems even with a single DOS application in the current OS/2, especially for communications applications. These glitches have reportedly been fixed in Version 2.0, and the ability to run multiple DOS and Windows applications in multiple boxes has been added.

- Cost considerably less. The current, bundled version of OS/2 costs $690. Expect Version 2.0 to come in at under $200. Most analysts agree that if IBM expects OS/2 to replace DOS, it's got to be priced in the same ballpark.
- Feature improved memory management, as well as more efficient use of the graphical user interface.

As mentioned, IBM has yet to formally unveil the new package, but beta test copies of it were scheduled to ship at the end of last month. And those who have seen or worked with Version 2.0 seem to be pleased.

"I think IBM's [OS/2 Version 2.0] is going to be a big winner," Finkelstein says, adding that he

(continued on page 70)

Comparing PC operating systems

Operating system	Availability	User interface	PC processors, systems supported	RAM required, supported	Data width, operation	Applications supported	Price
Microsoft Corp. MS-DOS Version 5.0 (available from IBM as PC-DOS)	Current	DOS commands, some limited window presentation (also for configuration)	Intel Corp. 8088 (original IBM PC), 286 (IBM PC AT), 386, 486	640K to 1M byte (extended)	8/16 bit; single-tasking, but user can toggle between 2 applications	DOS	$165; $125 for additional copies; $85 for upgrade from DOS 2.1 or later (prices if purchased from IBM)
Microsoft Corp. MS-Windows* Version 3.0 (requires DOS 3.X or higher)	Current	Graphical; requires graphics adapters	286, 386, 486	640K to 2M bytes (practical minimum); 4M to 8M bytes (typical)	8/16 bit; single-tasking; applications invoked or suspended by clicking window	DOS, Windows**	About $100
IBM OS/2 Extended Edition Version 1.3	Current	Graphical for OS/2 applications; DOS-compatibility box	286, 386, 486	6M to 8M bytes (practical minimum); up to 16M bytes for 286; virtually unlimited for 386 and 486	16/32 bit; multitasking	DOS, OS/2***	$690 for Extended Edition; $150 for Standard Edition (without Communications or Database Manager)
IBM OS/2 Version 2.0	Second half 1991	Graphical, with multiple DOS/Windows boxes	386, 486	2M to 4M bytes (practical minimum); maximum memory virtually unlimited	32 bit; multitasking; reportedly will also run 16-bit applications	DOS, Windows, OS/2****	Free upgrade to current users of OS/2; expected to sell separately for less than $200
Microsoft Corp. OS/2 Version 3.0	1993	Graphical; specifics unknown	Unknown	Unknown	32 bits; operational details not known yet	Unknown	Unknown

*** Not an operating system itself; requires DOS to be considered an operating system.**
**** Performance degrades and some operational problems reported for mix of DOS and Windows applications.**
***** Both supported via either a single DOS box and memory partition or dual-boot operation.**
****** DOS supported via multiple DOS boxes; Windows supported via multiple DOS/Windows boxes.**

GRAPHIC BY SUSAN SLATER

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON, N.J.

Microsoft sold about three million copies of Windows — 10 times more than sales of OS/2 to date.

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IBM has taken its lumps with the current OS/2.

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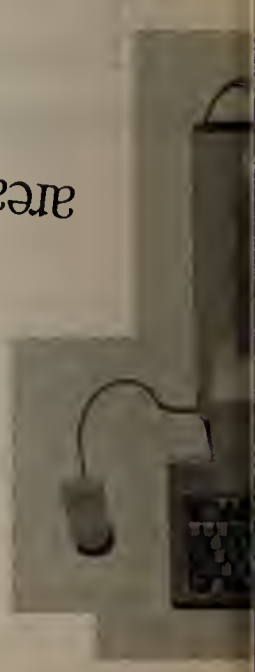

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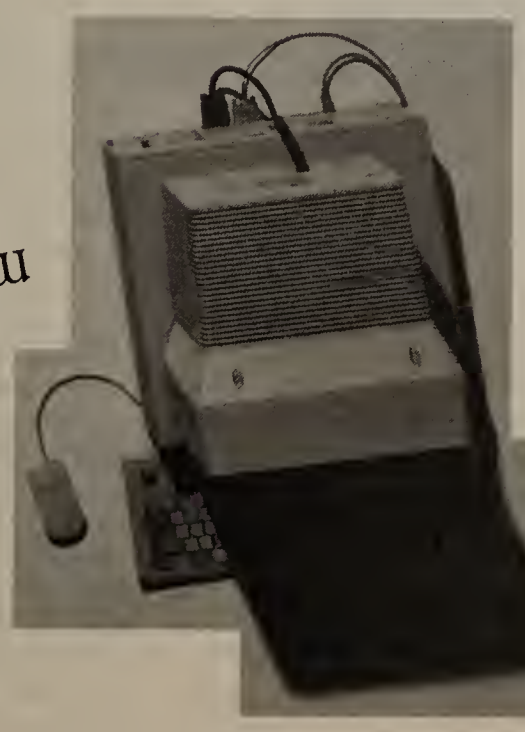

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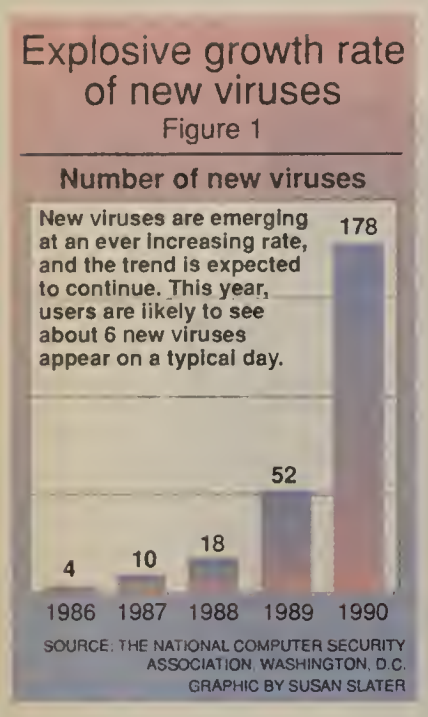
Virus inoculation

continued from page 51

work, the executable file for that program is compared to a list of authorized files maintained on the server. For example, SiteLock compares the file name, byte size, owner name and creation date of a file prior to running a program.



An infected program, even an authorized one, is likely to have different characteristics than a clean copy. If the local drive version of the program does not match the characteristics of the clean file, the local program cannot be run on the network.

"Checking a file against a registered clean copy is the most reliable method of protection against any virus," says Lori Miano, a network administrator at Farmington, Conn.-based Otis Elevator, Inc.

Net/Assure takes a different approach by using a plug-in card along with software to control execution of unauthorized software. The plug-in card works in conjunction with a workstation's network interface card (NIC). Users must enter a password that is checked against valid passwords for the particular NIC address.

An advantage of Net/Assure is that laptop computers can be fitted with the plug-in card. If the laptop is connected to the network, it has the same level of security as a hard-wired workstation. That is, the user must enter a password associated with the NIC in the laptop.

Added protection

Even with such protections in place, net managers should be on the lookout for viruses. This doesn't require any special equipment, just awareness on the part of the net manager.

"Don't wait until someone says they're out of disk space," Micro One's Jackson says. "As viruses propagate, they consume disk space. So you should be checking disk structures regularly."

What should be checked? "Look for new directories that suddenly appear," he says. "Or for a disk that loses 20M bytes of storage capacity in one hour or 200M bytes in one day." If any of those things happen, you may have a virus, he says.

Virus scanners

Virus scanning software can also help. Many products check for file size changes as well as program structure changes, such as a different cyclic redundancy check. There are many commercial virus scanning programs on the market as well as many shareware products available from several on-line sources (see Figure 2, this page).

Virus scanning programs, which range in price from a dollar per machine for many shareware products to $100 or less per machine for commercial products, offer a relatively inexpensive way to check for viruses. The problem with most scanning programs is that they are designed to identify existing viruses, not new strains.

Virus-scanning software vendors recognize the problem and have taken a variety of approaches. For example:

- Microcom, Inc. in Norwood, Mass., frequently issues upgrades to its VPScan product line. The company developed installer programs that make loading new versions of the software onto workstations easier and less time-consuming.
- McAfee Associates in Santa Clara, Calif., offers upgraded versions of its product line via the CVIA bulletin board.
- Central Point Software, Inc. of Beaverton, Ore., releases quarterly upgrades, and users can download characteristics of new viruses from a company bulletin board as well as from Central Point's CompuServ Forum.
- Torrence, Calif.-based Trend Micro Devices, Inc.'s product uses artificial intelligence to search for viruses, making upgrades unnecessary.

However, purchasing virus scanning software and other programs and equipment to keep viruses off networks is just one part of the antivirus strategy.

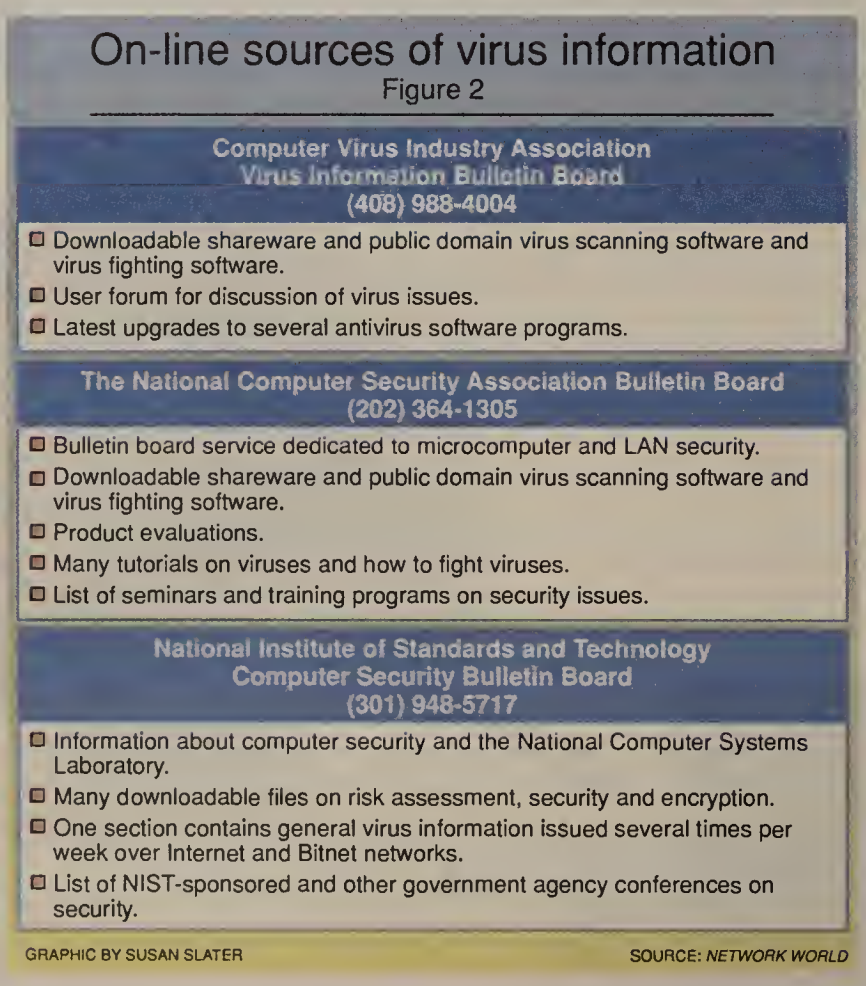
What to do

Industry analysts say net managers should develop a comprehensive plan to deal with the virus issue. The plan should include:

- Assessing the risks to the network from viruses.
- Assessing the dollar damage that would be incurred if data is destroyed or networks are shut down by virus infections.
- Educating employees on the sources of virus infections and what constitutes safe computing practices.
- Deciding whether, and where, network access should be limited.
- Securing servers and workstations on LANs.
- Backing up important data.
- Protecting important program files by making them read-only.
- Keeping track of network resources, such as disk space on servers and workstations.
- Routinely scanning for viruses on servers and workstations.
- Checking all downloaded files for viruses.
- Scanning disks (particularly shared floppy disks or disks of borrowed software) for viruses before using them on a network.

Implementing an antivirus plan based on these points requires a wide variety of equipment to solve the network virus problem, funds to pay for the equipment and an appreciation by end users of the magnitude of the network virus problem.

All data about viruses suggests that they are going to be around for a long time. Users that are prepared with a proper preventive strategy will head them off and stay one step ahead of the competition.



Worth winding toward OS/2?

continued from page 67

expects software developers to turn their attention from Windows to the new OS/2 shortly after it has shipped.

"We'll see software developers turn around in six months," he says, "and everyone will be writing for OS/2."

> "OS/2 Version 2.0 is going to be the reason to go to OS/2 for a lot of people."
>
> ▲▲▲

According to Finkelstein, IBM needs to reorient its marketing to keep pace with the personal computer world. "If [OS/2 Version 2.0] doesn't go beyond the Fortune 500, it will be because of IBM's marketing and not the product's technology."

Corriveau agrees. "[OS/2 Version] 2.0 is going to be the reason to go to OS/2 for a lot of people."

The final choice. . .

Most MIS and network managers would agree that, to exploit recent advances in personal computer hardware and software, changes in their organization's personal computer operating systems will need to be implemented within the next few years. But not many users are clear on what their next major evolutionary step should be.

Here are some factors to take into account. First, managers must consider the installed base. OS/2's lack of installed base as a workstation operating system has already been discussed.

As a server operating system, OS/2 runs a distant third in popularity behind Novell's NetWare and the family of Unix-based packages, such as Banyan Systems, Inc.'s VINES. Among the OS/2-based server systems is Microsoft's LAN Manager. IBM's OS/2 LAN Server, is another implementation of LAN Manager.

However, all of LAN Manager's application program interfaces and client/server protocols are also now supported on top of Unix (such as with AT&T's LAN Manager Server software). OS/2, therefore, has lost the exclusive association it had enjoyed as LAN Manager's designated operating system.

Turning to the choice of OS/2 as a desktop operating system, one strength for OS/2 in this decision is its communications advantage over DOS as a multitasking operating system. OS/2 can inherently run multiple communications applications, supporting a variety of concurrent network environments; DOS cannot.

But there are ways of beefing up DOS or Windows over DOS to achieve almost the same effect. At today's prices, purchasing and installing high-powered communications coprocessor boards into DOS-based personal computers will typically cost about the same as making all the upgrades needed to install OS/2.

A final factor to consider is IBM's strategic communications vision and its undying support of OS/2. In True Blue shops, IBM's designation of OS/2 as the way to go for advanced SNA networking (including the announced IBM software that will deliver APPN to OS/2 nodes) will undoubtedly sway some to chose OS/2.

But except for LU 6.2, which the applications industry has so far shunned, there are few, if any, protocols or SNA logical unit types that OS/2 will support that a DOS system will not.

In sum, the major factors that many users will find in making the choice of desktop or server operating systems are likely to be the availability and price of communications applications for the different operating environments. Regardless of whether the user's strategic network plan calls for their nodal operating system to support TCP/IP, Network Basic I/O System, X.25, or any of the common SNA terminal protocols (3270, 5250 and so on), it is very likely that for the next five years there will be more packages, from more vendors, at lower prices, available for Unix and DOS than for OS/2.

> "OS/2 can inherently run multiple communications applications.
>
> ▲▲▲

As noted, the factors critical to choosing an operating system for the desktop have diverged from those of servers. So, users' best strategy may be to plan on two personal computer operating system standards — one for each.

Of course, either or both could be OS/2, but at the moment, there does not seem to be a strong case for using it on either side. Indeed, until IBM unveils full details of OS/2 Version 2.0, it will not be clear whether OS/2 should be one of these standards.

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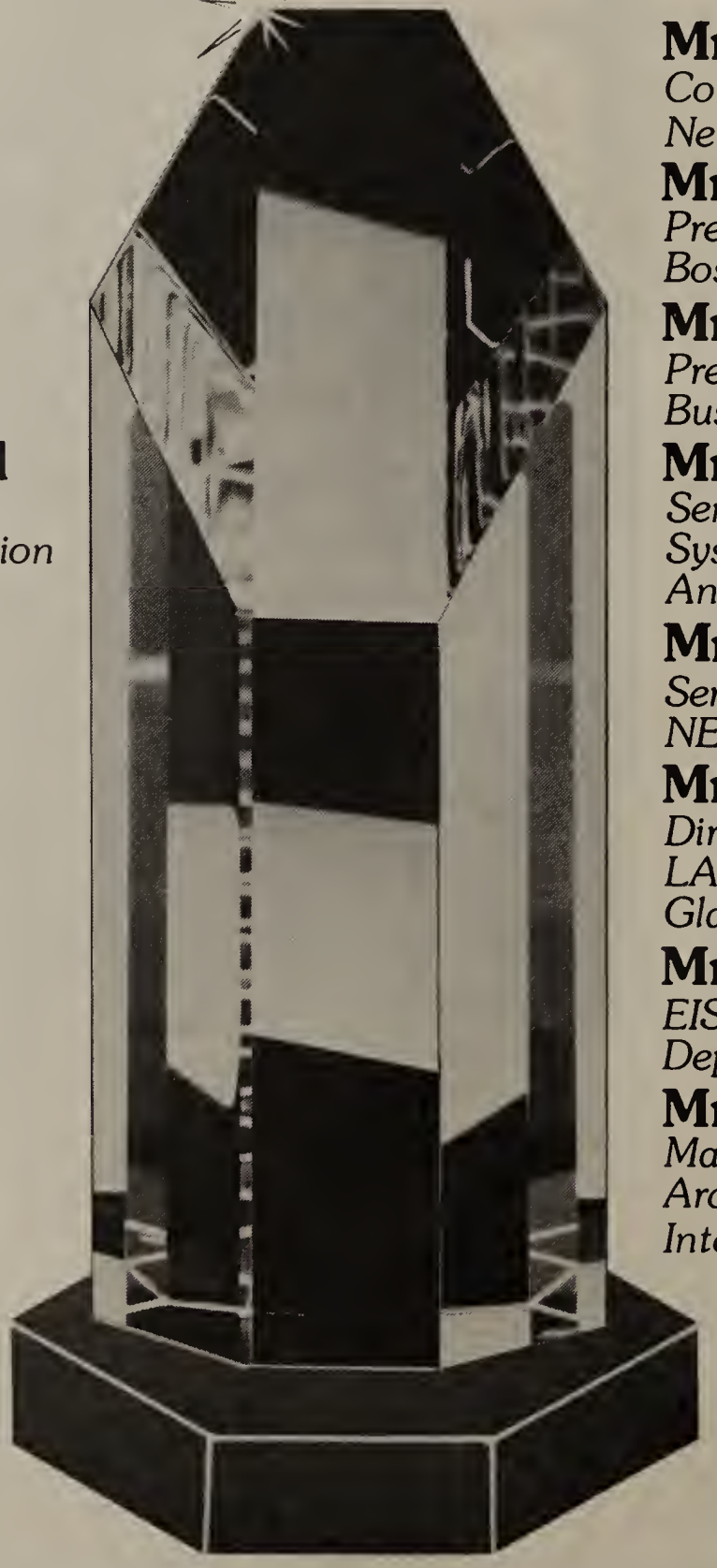

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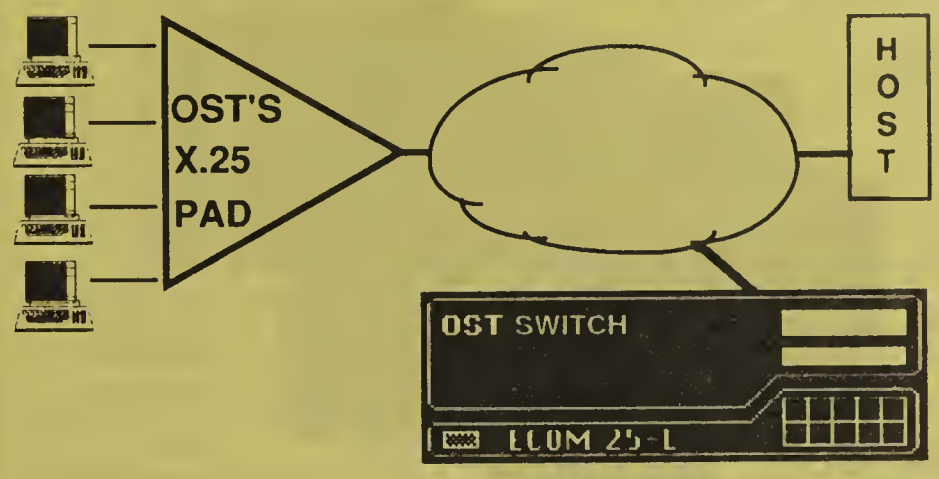

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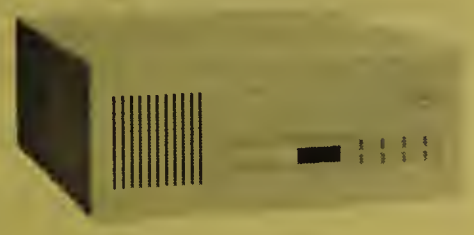

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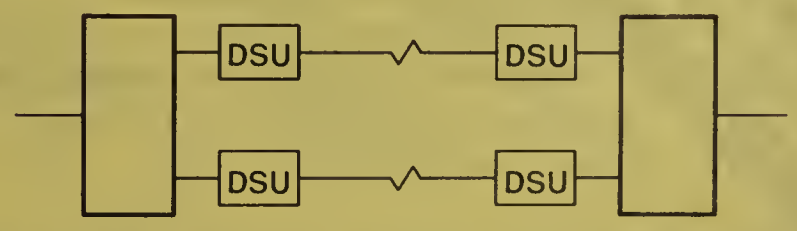

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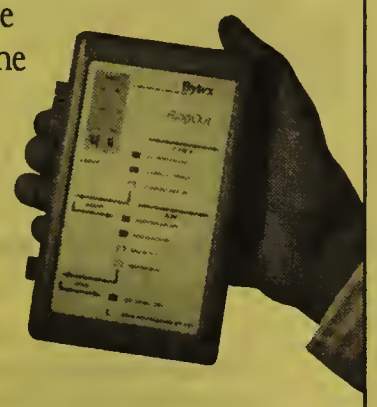

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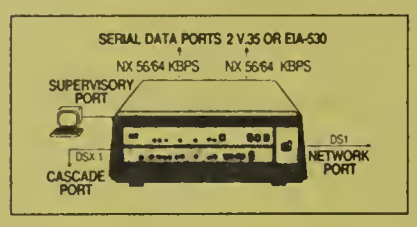

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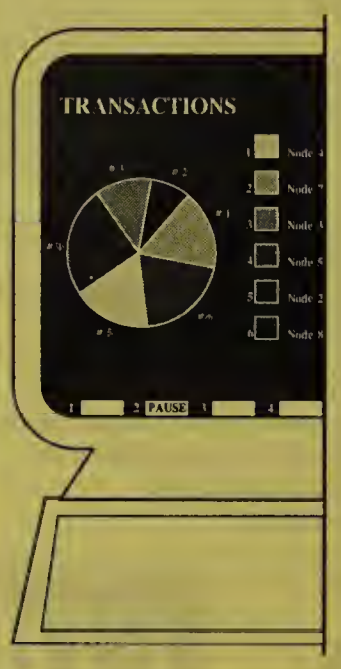

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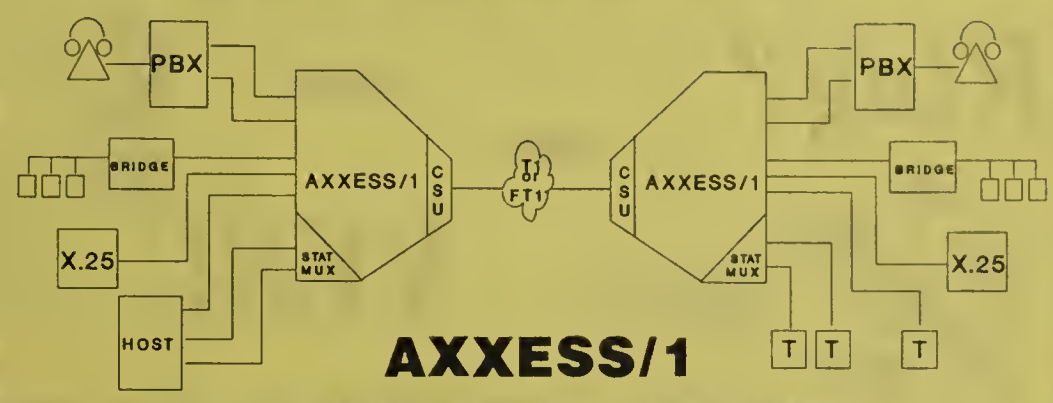

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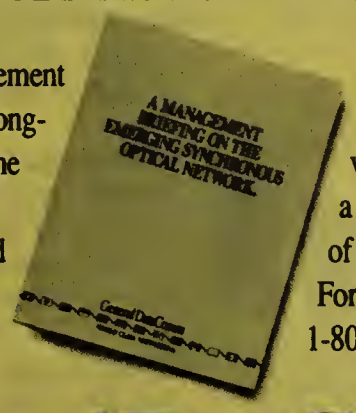

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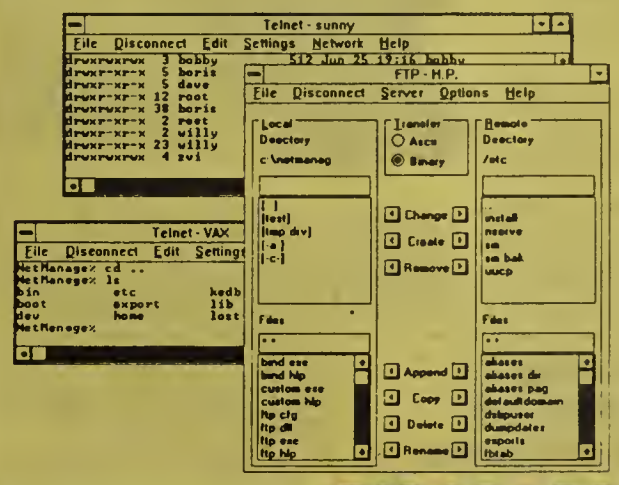

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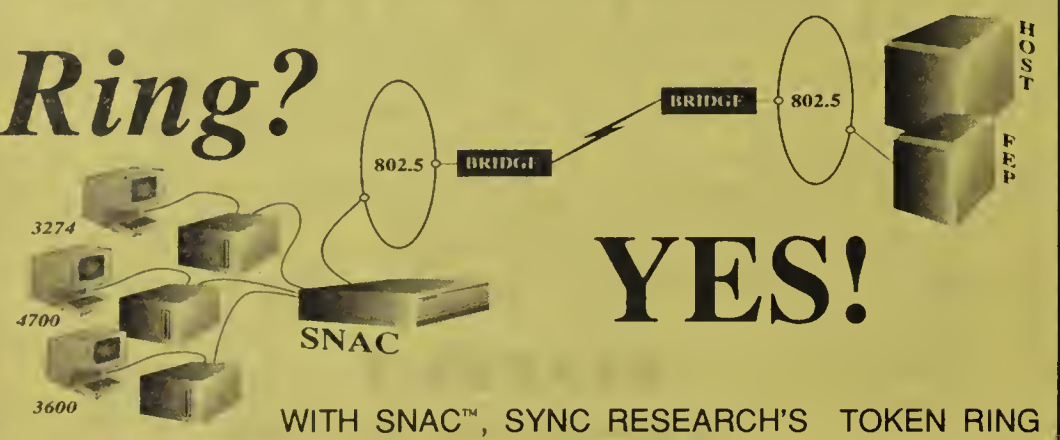

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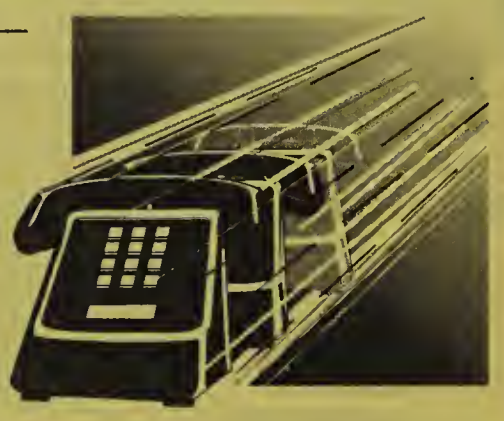

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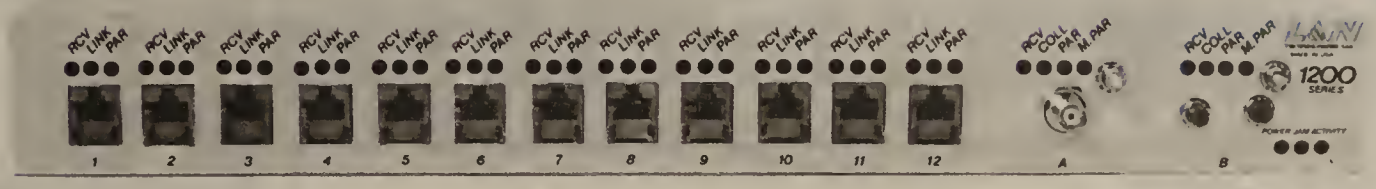

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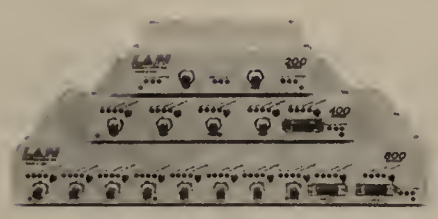

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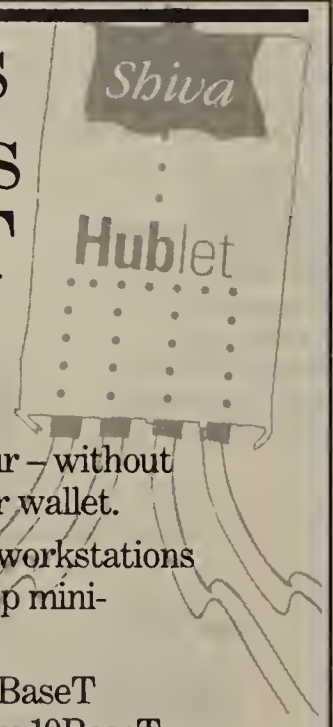

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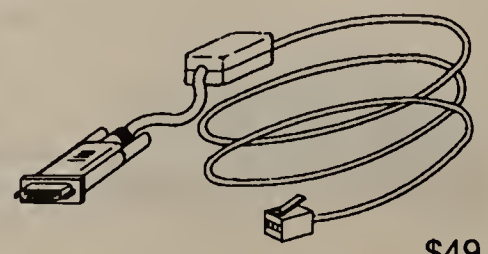

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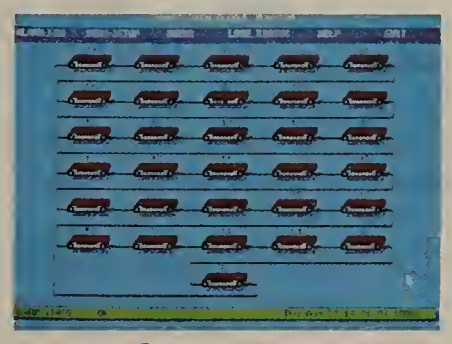

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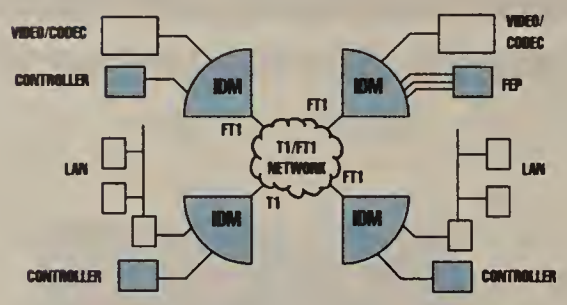

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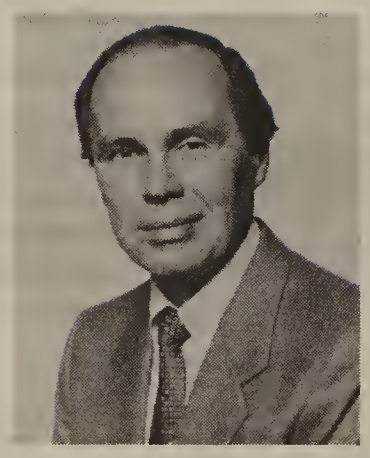

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Borland buys Ashton-Tate

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dox data base product.

In fact, Borland said last week it plans to roll out a product, currently called Object dBASE, that will allow the two incompatible DBMSs to share information.

"This acquisition is good news for shops that have both dBASE and Paradox," said Nancy McSharry, an analyst at the Mountain View, Calif., office of International Data Corp., a market research firm.

Borland International, Inc.

Based: Scotts Valley, Calif.

Revenue for year ended March 31:
$226.76 million

Primary products:
Paradox relational data base, Quattro Pro spreadsheet, Turbo Pascal programming language, Sidekick business and personal organizer software

According to Alec Ellison, a principal at Broadview Associates, a Fort Lee, N.J., investment firm, "The big question is, which data base product will be most promoted and survive? Borland needs to decide which product is best for the client/server world since so many companies are moving in that direction."

Ashton-Tate brings with it products such as a new client/server version of dBASE that links into Microsoft Corp.'s SQL Server back-end data base. Borland offers Paradox SQL Link, which gives users access to SQL data residing in minicomputers, mainframes and data base servers.

By using technology from Ashton-Tate's Interbase group, which makes object-oriented data base software, Borland plans to develop products that allow data base systems to work across personal computer, server, minicomputer and mainframe platforms, said Bill Lyons, Ashton-Tate's chairman and CEO.

Vying for a top spot

Peter Kastner, a vice-president at Aberdeen Group, Inc., a market research and consulting firm in Boston, said the acquisition is bound to make Borland more competitive in both the personal computer and high-end system data base markets.

"Borland, with this acquisition and its aggressive R&D and merchandising of Paradox, not only refuses to concede the departmental data base market to Microsoft and Oracle [Corp.], but intends to become one of the leading suppliers of networked data base products," he said.

In addition to Paradox, Borland's products include the Quattro Pro spreadsheet and Turbo Pascal programming language. The company has stolen market share from Ashton-Tate in the DBMS arena in recent years by aggressively pricing Quattro Pro.

Ashton-Tate, which has struggled financially since rolling out a flawed version of its cornerstone dBASE product in 1989, also sells spreadsheet, graphics and word processing software.

Bulking up

According to Dave Marshak, a senior consultant at Patricia Seybold's Office Computing Group, Borland sought Ashton-Tate largely because it needed to bulk up to survive in the software market, which is increasingly becoming dominated by large players.

Microsoft's acquisition of Consumers Software, Inc. and Lotus Development Corp.'s purchase of cc:Mail earlier this year serve as examples that the big are getting bigger in the software market.

"For Borland, it was probably the battle of size more than the battle of products that made this happen," Marshak said.

Ashton-Tate Corp.

Based: Torrance, Calif.

Revenue for year ended Dec. 31, 1990:
$230.54 million

Primary products:
dBASE DBMS, Multi-Mate word processing software, Full Impact spreadsheet

"To be competitive, a company can't stay small. Lotus made that clear. Getting big requires going to additional areas," he said.

West Coast Bureau Chief Timothy O'Brien contributed to this article.

GE unit builds global internet

continued from page 1

GE Nuclear Energy designs, builds and manages nuclear power facilities around the world. The global LAN internetwork is expected to make the company more competitive by streamlining operations, speeding the transfer of information and increasing access to corporate data for some 3,000 employees worldwide. "We want to improve the way we do business by taking full advantage of this network," said Sush Patel, project manager of the enterprise network for GE.

The company currently relies on a variety of networks, including Ungermann-Bass, Inc. Net One, IBM Systems Network Architecture, Digital Equipment Corp. DECnet and Apple Computer, Inc. AppleTalk LANs.

Last summer, the firm began planning for an enterprise network that could link different types of mainframes, minicomputers, workstations and personal computers worldwide.

With the support of upper management, the project team at GE — aided by consultants — established a four-phase implementation plan that addressed cabling in its first two phases as well as LANs and internetworking in the final two phases.

GE contracted to have a Fiber Distributed Data Interface backbone installed throughout the campus facility that would link mainframes, minicomputers and the Banyan LANs. Eventually, the network could support not only data, but voice and video as well.

Chipcom Corp. concentrators linked to the backbone will support 10BaseT Ethernet connections to VINES-based servers, personal computers and workstations. The net will also support Transmission Control Protocol/Internet Protocol, and the company is installing Cisco Systems, Inc. routers for wide-area communications.

GE saved money by using internal staff to pull unshielded twisted-pair wiring. This phase was completed last month.

"We're going to make the network as ubiquitous as a telephone. If someone has a phone, they are also going to have a data port," said Bob Carpenter, manager of computation and information systems for GE Nuclear Energy.

LANs or personal computers at other GE Nuclear Energy sites in the U.S. and abroad will be linked to the campus network by fractional T-1, leased 56K bit/sec, X.25 or dial-up links, depending on net traffic volume.

For the third and fourth phases, Hughes LAN Systems was selected to provide the LANs and internetworking. GE is employing the LANs to build an enterprise net to support many of the current mainframe applications that run the business.

The company is also planning to move some large systems applications down to the LANs, including data bases and engineering and project control programs. The LANs will support electronic messaging, imaging, and work-flow and groupware applications in the future.

Recognizing that GE had limited internal resources for the net integration, Patel said the company decided to team with a strong partner to handle installation of the LANs and the internetworking. GE is meeting with Hughes to finalize the net's hardware and software components.

Patel said the company selected VINES because of its superior wide-area communications facilities. In effect, he said, VINES enables GE to build a single global LAN across its geographically dispersed facilities.

GE hopes to have the entire enterprise network in place by the end of 1992.

Frame relay may impair X.25

continued from page 1

switching equipment.

Saddled by an error-checking feature that proved valuable years ago, X.25-based products today are considered too slow to support the transmission of data between local-area networks, which are spreading quickly as users downsize applications from host-based terminal nets. Most X.25 networks typically do not run at speeds higher than 56K bit/sec, which is far too slow to accommodate LAN traffic.

However, X.25 will continue to meet the needs of many domestic users for existing terminal-to-host and transaction-oriented applications. And domestic users are also expected to continue using X.25 to communicate with overseas offices as frame relay is not expected to catch on abroad right away.

"X.25 won't die immediately," said Mary Modahl, director of network strategy research at Forrester Research, Inc., a Cambridge, Mass., market research firm. "[Users] will continue to install X.25 equipment until vendors offer frame relay products ubiquitously. Ultimately, though, frame relay makes a lot more sense than X.25 as an interface for LAN-to-LAN applications."

According to Rick Malone, a principal at Vertical Systems Group, a Dedham, Mass., market research firm, the X.25 equipment market will hit its peak this year but will start declining next year.

Vertical Systems estimated the X.25 packet-switch market will fall from $247.5 million in the U.S. this year to $232.2 million next year. The market is expected to shrink by 8% a year to less than $200 million by 1994, according to the market research firm (see graphic, page 1).

Contradicting the downward slide in X.25 packet equipment, the X.25-based network services market is expected to grow — albeit slowly — in the U.S. by supporting electronic messaging, point-of-sale transactions and links to international sites , analysts said.

"The deployment of LANs rather than terminals directly cabled to X.25 switches, and the deployment of bridges or routers instead of multiplexers and packet switches, has definitely cut into the X.25 market," Malone said. "The world is moving away from the discrete terminal connections that were the heart and soul of X.25 network configurations."

Ravi Gulati, president of StonyBrook Technologies, Inc., a Bohemia, N.Y., network integrator, said X.25's popularity will wane given users' current needs.

"X.25 was never designed to be a backbone technology," Gulati said. "It was designed to be an interface between a terminal and a network node. There will continue to be a lot of this traditional X.25 access traffic, perhaps feeding into frame relay backbones."

The biggest change affecting the market for X.25 products is the growth in LAN traffic passed over wide-area networks. Frame relay, which can run at T-1 speeds and possibly higher, is better suited to support high-speed LAN traffic than X.25.

In fact, where users have linked LANs in the past, they have typically shunned X.25 in favor of more expensive but higher speed leased lines, said John Holmelad, vice-president and general manager of network systems at Sprint International in Reston, Va., a maker of X.25-based packet switches.

Vendor focus

Having recognized changing user needs, X.25 vendors are focusing their research and development dollars on upgrading their product lines to support frame relay, said Jeremy Frank, a vice-president at Gartner Group, Inc., a Stamford, Conn., market research firm.

"X.25 is a stable standard," he said. "What more can you add to it at this point?"

Sprint International is upgrading both the software and hardware of its TP4900 packet switches to support frame relay, Holmelad said. This will enable users to feed X.25 traffic onto frame relay backbones, among other things.

Sprint Data Group, meanwhile, is rolling out a frame relay network this quarter to complement its X.25 value-added network and plans to link the two by next April, said Dom DeAngelo, vice-president of product management at Sprint Data in Reston.

Amnet's Hill agreed that X.25 demand in the U.S. is softening and added that his company plans to announce frame relay support by year end via a new software module for its products.

Some users are reluctant to scrap their X.25 networks right away, even though they are moving to frame relay.

"We have a large installed base of X.25, so it doesn't make any sense for us" to pull it out, said Chris Taylor, manager of California State University's network, which is being upgraded to frame relay (see "CSU upgrades packet net to frame relay-based T-1 net," page 2).

One segment of the U.S. market where X.25 is expected to continue thriving for years to come is the federal government, Gulati said. This is because the Government Open Systems Interconnection Profile forces federal agencies to buy OSI products, such as those based on X.25, where possible. Frame relay is not an OSI standard.

Senior Editor Paul Desmond contributed to this article.

BOCs divulge cause of crashes

continued from page 1

caused the devices to send out maintenance messages to other STPs telling them to take the afflicted STP out of the loop until it could recover.

For some reason as yet undetermined, this interaction caused all the STPs to start generating an inordinate number of maintenance messages. Without the algorithm to act as a governor, the high-priority error messages soon began displacing call signaling.

A team of experts headed by Bell Communications Research is exploring why the STPs became overburdened by the maintenance messages. Some network engineers speculate that STPs may not have enough processing capacity to properly handle reconfiguration instructions flowing among them.

This scenario could explain the outage at Bell Atlantic.

One possible explanation

Some observers last week conjectured that Bell Atlantic's Baltimore STP that caused the outage may have been unable to process maintenance messages to and from surrounding STPs quickly enough and, therefore, was never able to free itself to handle calls.

As a temporary measure to deal with the cascading maintenance messages that caused the Bell Atlantic and Pacific Bell outages, DSC provided the carriers with a software patch that sets a threshold for the number of maintenance messages that can be processed by an STP.

Once the messages reach that level the device will discard error messages.

At the congressional hearing, Perpiglia said the CCS7 protocol did not contain an option for discarding error messages, so the patch had to be developed.

No fail-safe plan

CCS7 networks are highly dependent on complex software and have configurations that concentrate traffic control at a few nodes, factors that tend to magnify any problems.

"[CCS7] is an idea that I find flawed in the sense that it can take an entire network down," said John McDonald, president of MBX, Inc., a communications research firm, and former head of the National Research Council committee that produced a report in 1989 warning that the public network was becoming more vulnerable to outages.

"Traffic is now centralized through common points rather than being distributed, and if the common points fail, the network will go down," McDonald said.

"Common Channel Signaling is putting a lot of eggs in one basket," agreed Don Jones, vice-president of network strategic planning at BellSouth Corp.

He said carriers have been meticulous about building high levels of redundancy into each network component and transmission link, but vulnerabilities remain.

"What happened [to Bell Atlantic and Pacific Bell] should not have happened," Jones said. "Obviously, there's a [chink] in our armor; there's something that was not anticipated."

STP pairs are always deployed in physically separate locations, each of which is capable of picking up the load of the other in an emergency. Virtually every component of each STP is redundant, and STPs are tied to one another and to central offices over physically diverse, redundant links to guard against cable cuts or failures.

However, all of these backup measures are geared toward averting the more traditional type of hardware or transmission line failure rather than the type of software problems that caused the recent outages.

"We've focused all of our redundancy on physical diversity," said John Seazholtz, vice-president of technology and information services at Bell Atlantic. He conceded that, since software is a common thread among all STPs, the potential exists for a massive failure.

A recurring problem?

Despite the measures carriers have taken to build in redundancy, McDonald told Congress last week he doubts the outages will be eliminated. "I don't think [CCS7] can be designed so that it never has an outage," he said. "I think that's impossible."

McDonald and other experts claim the carriers do not have adequate backup systems for CCS7. When AT&T had a network outage in 1990, it was able to turn to its CCS6 network in order to complete calls. But the local carriers and other long-distance carriers that are just now putting in signaling networks do not have CCS6 technology to fall back on.

According to Walt Roehr, executive director of Telecommunications Networks Consulting, based in Reston, Va., the carriers have overestimated the reliability of CCS7 and failed to implement adequate backup for CCS7. One major reason is cost.

"People have gone with the fairy tale that CCS7 is a self managing network," he said.

John O'Rourke, assistant vice-president of switching technology analysis for Bellcore and head of the team examining the outages, agreed that backing up CCS7 may be a problem. He said any backup system would need to be consistent with CCS7 technology. Trying to implement a backup network based on an inconsistent technology, such as the inband signaling used today, "would be a little like trying to use the streets of D.C. as a backup for the interstate highway," he said.

RBHCs solicit MFJ waiver

WASHINGTON, D.C. — Bell Atlantic Corp. and Pacific Telesis Group last week rushed to U.S. District Court Judge Harold Greene wanting to know if the Modified Final Judgment banning RBHCs from manufacturing would forbid them from assisting vendors in making software changes during emergency repairs.

The two companies, struggling with mysterious network failures, asked the court for an emergency waiver that would enable them to make software and hardware design proposals to DSC Communications Corp., the vendor of the signal transfer points that caused the outages.

Greene, crafter of the Modified Final Judgment, ruled that design changes made during the course of troubleshooting are allowed under the Modified Final Judgment and do not require a waiver.

The regional Bell holding companies said the ruling marks the first time Greene has taken a stand on the manufacturing ban in the light of repair situations, clearing up some gray areas of RBHC activity under the decree.

James Young, Bell Atlantic vice-president of regulatory and industry relations, said the company was forced to go to court when the Department of Justice waffled on whether it was legal for the Bell company to write software to correct problems in the DSC switches.

After hearing testimony last week from AT&T, MCI Communications Corp., the Justice Department and the two RHBCs, Greene said, "To the extent that I can understand what's happening now, it's not a violation of the decree to do it without a waiver." He warned Bell Atlantic and Pacific Telesis, however, not to go beyond troubleshooting. AT&T and MCI attorneys said they did not regard troubleshooting as an activity requiring a waiver, but AT&T attorney Mark Rosenblum said writing code for new functions would violate the consent decree.

Greene did not engage in legal hairsplitting during the crisis. Within five minutes of hearing argument, he decided to allow the designing of software for the repair purposes during troubleshooting.

— Ellen Messmer

RISC-based micros key

continued from page 4

ance is not likely to change IBM's commitment to OS/2 overnight.

IBM positions AIX and OS/2 based on users' applications and current environment, according to a company spokeswoman.

One of the reasons Unix has languished in the mainstream desktop market while other operating systems have flourished lies in the operating system's origin. Unix was developed on minicomputers and was later migrated to technical workstations that offered processing power, as well as disk and memory capacities comparable to the larger machines.

> Management of Unix requires a higher level of expertise than DOS or even OS/2.
>
> ▲▲▲

The transition to the microcomputer world requires some fundamental operating system changes that the major Unix vendors are only now making.

The Unix kernel — the core instructions of the layered operating system — has to be reduced significantly to lessen the need for memory and other system resources that are usually beyond the budget allocation for most microcomputers. To be successful at the desktop level, Unix must take up less than 2M bytes of memory, Kirzner said.

Both major Unix groups — Unix Laboratories, formerly AT&T's Unix division, and the Open Software Foundation — are expected to release microkernel versions of their Unix implementations next year.

There have been versions of Unix for the microcomputer market, such as products from The Santa Cruz Operation, Inc. and Interactive Systems Corp., but they have been used primarily on high-end, multiuser microcomputers.

Other important reasons Unix has failed to capture the desktop operating system market are price and availability of applications. Unix is more expensive than DOS, partly because the Unix market share has been much smaller than that of DOS, Kirzner noted.

And unlike DOS, which runs on one hardware architecture, applications for Unix have to be converted for each hardware-specific version of the operating system released.

In contrast, microcomputer users have been used to purchasing software in "shrink-wrap" form, meaning they can buy any DOS application and run it on any microcomputer based on the Intel Corp. processor.

Last place

Since DOS is generally acknowledged to be yesterday's technology, the industry has been waiting to see which operating system — Unix, OS/2 or Microsoft Corp. Windows — will be its successor. A key factor in determining which one will succeed is how many DOS applications are ported to the each of the new environments.

In this regard, Unix is running in last place. The next OS/2 release, OS/2 Version 2.0, will be able to run any DOS application unmodified, giving it a clear advantage over Unix. And with the recent popularity of Microsoft Windows 3.0, software developers are expected to put more efforts into developing Windows-compatible versions of their applications.

Another strike against Unix is the level of technical support it requires. Even with graphical user interfaces, management of Unix requires a higher level of expertise than DOS or even OS/2.

Where Unix shines is in networking. TCP/IP is widely supported and has recently gained

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NETWORK WORLD

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RISC-based micros key

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the status of de facto standard. Virtually every other operating system, including DOS, supports the network protocols.

Since TCP/IP is native to Unix, most of the advanced networking technologies that use TCP/IP are available for Unix before they are available for other operating systems.

The Network File System (NFS), the de facto standard network file-transfer protocol developed by Sun Microsystems, Inc., requires TCP/IP. Although almost any operating system supporting TCP/IP can act as an NFS client, only Unix systems are capable of acting as NFS servers.

Unix, however, is not likely to win control of the overall desktop operating system market. Rather, it will continue to parlay these strengths into expanding the high-end desktop computer and server markets and will play a pivotal role in the spread of client/server computing.

Coalition to advance FDDI

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The other technology, jointly suggested by Cabletron Systems, Inc. and National Semiconductor Corp., fully complies with the current FDDI specification but requires use of data-grade unshielded twisted pair instead of voice-grade wire.

Data-grade unshielded twisted pair is a new type of wire for data applications that limits interference and electrical emissions better than voice-grade cable, which is used with private branch exchanges and 10BaseT Ethernets.

There is a separate camp working on a standard for FDDI over shielded twisted-pair wire. The effort is being backed by Advanced Micro Devices, Inc., Chipcom Corp., Digital Equipment Corp., Motorola, Inc. and SynOptics Communications, Inc.

This technology is more straightforward and is already available. However, the only users with shielded twisted-pair wire in place tend to be IBM customers because IBM requires that cabling for some applications. And even within IBM shops, unshielded twisted-pair telephone-type wire is much more prevalent.

In addition to the vendors that are known to be backing Crescendo and UDF, several others, including Advanced Micro Devices, which manufactures FDDI chips, are said to be considering the technology but have yet to officially join the consortium.

According to Jayshree Ullal, director of product marketing at Ungermann-Bass, other vendors are expected to endorse the efforts of UDF and its proposal without actually becoming members.

With the formation of this consortium and the rallying of these major vendors behind the proposal, analysts said the Crescendo methodology will gain stature in the standards group.

This means good news for users, they said.

According to Rich Seifert, president of Networks and Communications Consulting in Cupertino, Calif., 90% of today's installed wiring is unshielded twisted pair. The Crescendo proposal will let customers use that voice-grade wire for FDDI, just as they currently use that wire for 10BaseT.

"Joe Network Administrator wants 100M bit/sec on the same wiring system he just put in for his PBX," Seifert said.

Michael Howard, president of Infonetics Research Institute, Inc., a consultancy in San Jose, Calif., agreed. "If the standard were based on data-grade cabling, it would almost be assured that users would have to rewire because there's just not a lot out there."

Analysts said users will be more concerned about having to pull new wiring than having a small portion of the FDDI standard altered.

"Users don't care about encoding schemes," Seifert said. "They just want to be able to plug into what's already installed."

Although more technologically sound, the new encoding scheme appears to be a major handicap for Crescendo because it does not comply with the existing standard. Analysts predicted that the company and those that develop products based on the standard will be particularly careful to make the necessary changes as easy as possible for users.

Smoke and mirrors

There is no guarantee, however, that the consortium will bring about much change.

"People have to remember that there's no product today," Seifert said. "The [shielded twisted-pair] guys are already selling something, but [neither of the unshielded twisted-pair] camps even has a technology demo."

Bill Spina, a consultant at Information Transport Systems, Inc. in Burlington, Mass., agreed, saying this may be one of the reasons why the consortium was formed in the first place.

"Rather than forming a committee, if a couple of vendors can get together and make a standard happen, the faster products will come to market," according to Spina.

"Yes," Seifert concluded, "we'll be able to run FDDI over [unshielded twisted pair] some day, but today it's all smoke."

Firm to improve int'l service

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When the Mercantile Exchange and Reuters announced Globex in 1987, officials were optimistic the net would help the exchange win back trading volume from overseas exchanges. Many saw Globex as the first wave of a technical revolution, where 24-hour, computer-based trading would increasingly supplement, or supplant, trading floors.

But questions about Globex's viability are surfacing, fueled partly by major deployment delays. Globex was initially supposed to come on-line in 1989. Now, according to Mercantile Exchange spokesman Andrew Yemma, it won't begin service until late this year at the earliest.

Yemma said Globex turned out to be technically more complicated to develop than initially anticipated. He added that further delays were caused when the Chicago Board of Trade agreed to use Globex last year, forcing engineers to rework Globex software and network operations.

Yemma declined to discuss the technical problems in more detail. But observers said one thorny issue is network response time.

Industry officials concur that in order to be accepted by traders, Globex will have to support response times comparable to trading on the telephone or on trading floors. This means Globex must complete transactions within two seconds, according to Alan Grody, president of Financial Intergroup Holdings, Inc., a consulting firm that helps exchanges build electronic trading systems.

But Grody said Globex officials have only promised perspective users three-second response time on 95% of all transactions, with the rest being completed within five seconds. And he said people involved in testing for the project have told him Globex may not even be able to meet this goal.

The officials said only 90% of Globex transactions are being resolved within three seconds and some transactions are taking as long as 40 seconds. Grody said Globex should eventually be able to bring response times up to acceptable levels. However, Lehman said he doubts that the net will ever be as fast as trading in person or on the phone.

Equal access woes

Another problem concerns the ability of all traders to have an equal opportunity to execute deals on Globex. This means all traders must see trading information at the same time and be equally able to respond to offers.

But this may be impossible in regions where network links are routed over poor-quality terrestrial facilities or via satellite. And because of limited terrestrial facilities, there are many countries that can only be reached via satellite.

A spokesman for the Commodity Futures Trading Commission, which regulates futures and options markets, said officials are questioning whether satellite propagation delays could cause trading information to be delivered to some traders later than to others and delay processing of their transactions. This could put traders in areas served via satellite at a disadvantage.

"You don't want a situation where one trader always gets there first," Grody said.

Yemma declined to comment on these specific concerns. He said, however, that the complaints are premature since Globex is still being developed. Globex officials are confident the network will work well and be widely accepted.

Firm devises single-chip unit

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Since the cost of token-ring technology is higher than Ethernet, integration of token-ring controllers on motherboards is not likely to occur in the near future, Seifert noted. Unless the components are affordable, it will not be cost-effective to build token-ring support into products.

Most of National Semiconductors' initial ST-NIC customers plan to build or upgrade adapter cards, and the company does not expect the NIC market to disappear overnight.

"What will really sound the death knell for adapter cards is a network controller that handles both Ethernet and token ring," De Souza said. However, such a controller would have to employ the standard technology for both net types, and while the Ethernet standard is controlled by the industry, token ring is still dominated by IBM.

Ideally, a user would simply plug in an RJ-45 connector, and the controller would sense whether the network was Ethernet or token ring and adjust accordingly, Seifert said.

Even if all major microcomputer makers eventually integrate net controllers on their motherboards, specialized applications for adapter cards will likely remain.

"What you might see is a minor resurgence of the smart NIC," Seifert said.

A smart NIC, which is an adapter card powered by its own processor, off-loads network tasks from the host CPU. Although they do not offer any network performance advantages, smart NICs boost the performance of the systems in which they are employed, he said.

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